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C. F. T. R. I.
FISH TECHNOLOGY EXPERIMENT STATION.
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U.S. DEPARTMENT OF THE INTERIOR
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C.F.T.R.I.
FISH TECHNOLOGY EXPERIMENT STATION,
Hoige Bazaar, MANGALORE-1.

1.01 THE PRESENT AND THE FUTURE OF WORLD FISHERIES

Wilimovsky, Norman J. (Institute of Fisheries, University of British Columbia, Vancouver, British Columbia)
Canadian Fisherman 55, No. 7, 18-23 (July 1968)

The author's aims are as follows: (1) to review the general state and the recent growth trends of the world fisheries; (2) to examine some of the underlying causes for the distribution and development of the fisheries; (3) to explore the prospects and the problems of the future by reviewing some of the incentives and liabilities in future expansion and development; (4) to briefly suggest some procedures or policies that might be followed to achieve the desired goals of a national fishery. Because the first two objectives are based on fact rather than on speculation, the author stresses the examination of these objectives with emphasis on the "why," "where," and "what" of the present fisheries and their trends.

The "why" section covers the reasons for the distribution and abundance of the world fisheries. Several factors contribute to the uneven distribution of the fisheries and catches. Currently harvested fisheries resources are confined chiefly to productive areas over the Continental Shelf, which are only 7.6 percent of the ocean's surface area. Two familiar and obvious factors that are often overlooked are the proximity of the fishing grounds to the market and the weather, which in many parts of the world has a dominant control over fishing.
(over)

 ABSTRACTER: M. F. Tripple

1.82 N.J. SHELLFISH SCIENTISTS SEEK WAYS TO GET CLAMS FROM FLATS TO STORES

Ammerman, John
National Fisherman 49, No. 6, 15C-16C (September 1967)

Since 1960 the shellfish of Raritan Bay, New Jersey, have been on the State's condemned list, owing to an outbreak of infectious hepatitis that was apparently caused by hepatitis virus carried by shellfish living in the Bay. The hard clams have been contaminated by the raw sewage and industrial wastes that flow into the bay from New York on the north and from industry in New Jersey on the south.

The heavily polluted water apparently has not affected the abundance of clams, for a survey in 1962 indicated that the Raritan Bay Channel contained about 3,000,000 bushels of clams. The tiny plant life and plankton that provide an important part of the hard clam's diet have evidently survived in the contaminated water and have received the necessary nitrogen and phosphates for their survival from the Raritan River, which empties into the bay.

Since the summer of 1965, the Rutgers Shellfish Laboratory has been searching for a commercial method of cleansing hard clams. Before the research staff can find a satisfactory depuration method, the factors that affect the clam's pumping activity must be known. In the laboratory, clams from polluted waters are further contaminated with known concentrations of bacteria or virus. The length of time necessary to cleanse the clam is then calculated. This time is dependent upon
(over)

 ABSTRACTER: S. G. Cordell

1.79 BASKING SHARK FISHERY

Anonymous
Commercial Fisheries Review 30, No. 7, 59-63 (July 1968)

For centuries the Norwegians have hunted the basking shark, primarily for its liver. Today the liver oil is refined into oil of varying quality; most of it goes into the cosmetics industry. The liver of the basking-shark is rich in squalene, which forms a vital part of beautifying creams and lotions. The liver oil is in high demand and brings a good price. As the price of oil rises, the basking-shark fishery grows. In 1966, 30 boats produced about 900,000 kilos of liver; in 1967, 53 boats took over 2 million kilos of liver.

Basking sharks are caught by wooden boats 50-70 feet long, carrying 20-50 tons, and having speeds of 8-10 knots. They are caught along the coasts of Norway, from the Kattegat to the Barents Sea, and on the banks of the North Sea. Little is known about the habits of basking sharks. One theory is that the fish spend the winter in the southern part of their distribution area, move north in the summer, and return in the fall. On the basis of new data, a second theory is that the fish are more stationary, and they form various local populations within their distribution area. The Mediterranean and the entire North Atlantic north of the tropics are considered one distribution area.

A small whale gun is used to catch basking sharks; however, the harpoon and wire differ from whaling equipment. A steel wire about 20 meters long is fastened
(over)

 ABSTRACTER: M. F. Tripple

2.01 (*) ROLES OF MICROORGANISMS IN THE DETERIORATION OF ROCKFISH

Lobben, J. C. (National Center for Urban and Industrial Health, Department of Health, Education, and Welfare, Cincinnati, Ohio), and J. S. Lee (Department of Food Science and Technology, Oregon State University, Corvallis 97331)
Applied Microbiology 16, No. 9, 1320-1325 (September 1968)

Microbial species belonging to the genera Pseudomonas, Achromobacter, and Flavobacterium have been found to be primarily associated with spoilage of fish. Little is known of the relative roles of each genus in fish spoilage. The purpose of this study was to differentiate the roles of the microbial species of these genera in the degradative process of fish muscle.

Three species of Pseudomonas, two of Achromobacter, and one Flavobacterium, each indigenous to fish, were inoculated into sterile fish muscle obtained from Sebastodes alutus and Sebastalobus alascanus (rockfish), and the production of total volatile acids (TVA) and total volatile bases (TVB) was determined during storage at 1° C.

The sterile fish (control), fish inoculated with Pseudomonas type III species (PIII-985), and fish inoculated with Flavobacterium (F-1070) showed no production of TVA and TVB. Inactivity of PIII-985 was due to its low level of maximal growth; the inactivity of F-1070 was due to its slow rate of growth. Pseudomonas (PI-950), Pseudomonas (PII-952), and Achromobacter (A-981 and A-70) grew and actively
(over)

*Item on back of card.

 ABSTRACTER: F. T. Piskur

THE PRESENT AND FUTURE OF WORLD OCEAN FISHERIES

BASKING SHARK FISHERY OF NORWAY

CLAMS IN RARITAN BAY, NEW JERSEY

MICROORGANISMS IN ROCKFISH DETERIORATION

1.79 (Cross Reference: 1.0141)

to the balance point of the harpoon. The wire is shackled to a thick, elastic nylon rope and is fastened about the bow outboard with an easily breakable string. The nylon rope passes over a block hanging from a gallows or standing on the starboard rail, along the deck, over a block beside the wheelhouse, and up to the winch.

The fishery demands good weather because fishermen depend on seeing the dorsal or upper caudal fin above water. On spotting a fish or a school, the vessel closes in on the fish from behind. As long as the fish stays just under the surface the lookout in the crow's nest can still direct the chase. There is no point in firing unless the fish is close to the surface. The harpooner fires at the thickest part of the body. The harpoon, which is attached to the wire at the balance point, will lie at a right angle to the wire when hauled in and make a good stopper.

The hauling in begins immediately. When the fish is under the starboard bow, the gunner kills it with a bullet through the brain. Once dead, a loop is put around one of the pectoral fins, and the shark is turned belly up. Now hanging by the loop, the harpoon wire is shackled out. The harpoon is taken on board by a long hook, and the wire is hauled through the fish. The belly is opened and the liver taken out. When the liver floats free, the body is let go. The liver is cut into pieces, hauled on board, and dropped into the hold. The entire operation from the time the trigger is pulled until the crew is ready for the next shark takes an average of 15 minutes.

2.01

produced TVA and TVB. For these species, the TVB levels increased steadily even beyond mxaimum growth of microorganisms, whereas the TVA levels declined toward the end of the storage period. Apparently a minimal microbial growth level of 10^8 cells per gram was needed before detectable levels of TVA and TVB were produced. Each species of microorganisms that grew well in fish produced TVA and TVB.

2.01 MICROBIAL SPOILAGE OF FOODS

Tonge, R. J.
Repts. Progress Appl. Chem. 51, 459-472 (1966)
Food Science Abstracts 2, No. 3, Abstract No. 68/336, p. 114 (March 1968)

The work published during 1965 and 1966 on the spoilage of foods by microbiological agents is reviewed. Some of the foods covered are: meat, poultry, fish and other seafoods, eggs, fruits, vegetables, and sugar.
[about 150 references]

1.01

The underdeveloped countries have close-in fisheries only; their fisheries are largely subsistence rather than an export market operation. As a consequence, the major fisheries are carried out by the advanced nations. The greatest fishery developments have occurred in the technologically advanced countries--gear and nets, bigger boats with more efficient power for distant-water operations, and development of new grounds.

The "where" centers upon the direction to be taken in the future by the fisheries. The author asks why $300 billion is annually taken from land resources whereas only $4 billion is taken from marine resources. The reasons he gives for expanding the fisheries are: (1) challenge, in that it is the nature of man to harvest, to turn something to use and profit; (2) the compelling reason of economics, because using more of the ocean resources will make men and nations richer and more powerful; and (3) the food and population problem. The author reaches the conclusions on the food-population problem that the problem is critical, there is no single solution, and all food resources must be developed.

The question of "what is the potential of the sea" is answered in broad connotation. Many stocks of fish are underutilized or are not utilized at all. There are marketing problems and processing limitations. The extent of present knowledge about living ocean resources is quite limited. The author suggests moving down the food chain or trophic level to harvest greater numbers of smaller fishes at the herbivore level. The great potential for fish protein concentrate lies in this approach.

1.82

the activity of the clam, which is affected by the water temperature, salinity, turbidity, and food content.

To record the relation between environment and activity, the researchers glue the clams to the bottom of the tank and then glue a thin wire to the upper half of the clam's shell. The thin wire is connected to a stiffer wire, which makes contact with a recording chart mounted on a clock-driven cylinder. As the clam opens its shell, the stiff wire makes a trace on the recording chart.

A method for measuring the clam's pumping rate and oxygen consumption consists of feeding the clam green-dyed sea water by positioning a glass tube over the clam's extended siphon and adjusting the flow of green sea water to the pumping rate of the clam. A liquid flowmeter measures the pumping rate. Oxygen consumption is measured by routing the water expelled by the clam through an oxygen meter.

2.05 NONSPECIFIC TOXICITIES IN THE MOUSE ASSAY TEST FOR BOTULINUM TOXIN

Segner, W. P., and C. F. Schmidt (Metal Division Research and Development, Continental Can Company, Inc., Chicago, Illinois 60620)
Applied Microbiology 16, No. 8, 1105-1109 (August 1968)

Detection of botulinum toxins by the mouse test involves intraperitoneal injection of white mice unprotected and protected with type-specific botulinum antitoxin. Death of the unprotected group and survival of the protected group is the positive test for presence of the botulinum toxin. Sometimes, however, demonstration of the actual presence of botulinum toxin is difficult due to occurrence of nonspecific toxicities--both the unprotected and the antitoxin-protected mice die. These toxicities are caused by some byproduct of bacterial growth or by an infectious process. The purpose of the study was to determine the cause of these nonspecific toxicities and to develop means of preventing them in assays for botulinum toxins.

Samples of haddock fillets were inoculated with varying levels of spores of Clostridium botulinum type E Beluga strain and were given 0.1 and 0.2 Mrad of radiation from a cobalt-60 source. Irradiated and inoculated unirradiated samples were incubated at 10°, 7.8°, 5.6°, and 4.4° C. At selected time intervals, samples were tested for presence of botulinum type E toxin.

(over)

 ABSTRACTER: F. T. Piskur

3.15 PROTEIN QUALITY OF IRRADIATED SHRIMP

Reber, Elwood F., and Mark H. Bert (Department of Food and Nutrition, School of Home Economics, University of Massachusetts, Amherst)
Journal of the American Dietetics Association 53, No. 1, 41-42 (July 1968)

This is a report on the protein efficiency ratio (PER) and protein quality of nonirradiated (raw and cooked) and irradiated (at 0.15 and 0.30 Mrad) white shrimp (Penaeus setiferus).

One portion of white shrimp was cooked in cans; second and third portions were packaged and gamma irradiated at 0.15 and 0.30 megarad levels, respectively; a fourth portion was frozen. The protein quality of the shrimp was calculated after the PER was determined. A group of rats was fed reference casein, and the control group was fed whole egg solids. During the 28-day testing period, the total weight gain and protein intake were calculated for each rat and the corresponding averages for each group computed. PER = weight gain/protein intake; protein quality = (assay group PER/casein PER) x 100

A study was made to determine if any thiaminase present in the raw, nonirradiated shrimp would influence the determination of protein quality. The average PER value for reference casein was 3.39; the average PER value for raw, nonirradiated shrimp was 3.66. When 2.0 milligrams of thiamine was added to the drinking water of the rats fed raw nonirradiated shrimp, the average PER value

(over)

 ABSTRACTER: S. G. Cordell

2.111 NETTING IN STATE OF CONSTANT CHANGE

Carmody, Earl (Nordby Supply Company, Seattle, Washington)
The Fishermen's News 24, No. 19, 7 (October 1968-Second issue)

The diameters of nylon net filaments are constantly being changed, especially those imported by companies that strive for netting with different characteristics. The standard nylon, which is 24-filament, is generally used in all industries. Now 18-, 15-, 12-, 7-, and 6-filament sizes have been developed, with the 15-, 7-, and 6-filament sizes being most suitable for netting.

Filament strength may be determined from the following general considerations. The actual strength per filament in relation to diameter and weight decreases slightly with each increase in diameter--in other words, a filament with twice the diameter, or four times the weight and volume, of a smaller filament is not four times as strong as the smaller filament. The more nearly parallel the fibers are laid, the higher is the total tensile strength of the filament.

Most of the new filaments are available from Japanese net manufacturers. Even heavier ones can be made--for example, 5- or 4-filement sizes--but uniformity and quality control are major problems. The 7-filament net has been improved until it generally compares with the 24-filament net in quality. One 7-filament, Japanese product, with an odd feel because of the material from which it is constructed and not because of any coating or treatment, has consistently tested out well.

(over)

 ABSTRACTER: S. G. Cordell

2.117 (*) LAUNCH LARGEST FIBERGLASS BOAT BUILT IN THE WESTERN HEMISPHERE

Anonymous
Fishing Gazette 85, No. 8, 12, 46-48 (August 1968)

An innovation within the fishing industry is the fiberglass boat. Recently a 72-ft. shrimp trawler, the R. C. Brent, Jr., was built and launched in Newport, Florida. The ship has the distinction of being the largest fiberglass boat in the Western Hemisphere. Shrimp boats heretofore have always been constructed of steel or wood.

The hull is made of balsa blocks attached to a fiberglass scrim surrounded by woven roving and mat. The sandwich construction gives the boat added strength, particularly against impact. The fiberglass reduces weight; adds space, for it requires no ribs or braces; and provides insulation and flotation. The most important feature is the increased profitability, which is a result of (1) increased hold volume, (2) increased fuel and water capacity, and (3) greater speed with no increase in engine size. An insurance underwriter states that his company will set a lower insurance premium for the fiberglass boats than for steel and wood boats. This lower rate is justified by the lower repair costs, the lower maintenance requirements, and the improved safety features of the vessel.

The design of the trawler incorporates both conventional and original features. Below deck, the structure is conventional; above, it is original, for the

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 ABSTRACTER: S. G. Cordell

MOUSE ASSAY TEST FOR BOTULINUM TOXIN

NETTING CHARACTERISTICS

PROTEIN QUALITY OF IRRADIATED AND NONIRRADIATED SHRIMP

FIBERGLASS BOAT DESIGN

2.111

The 15-, 17-, and 6-filament nets have been very effective in Canadian and United States waters; however, if the fisherman prefers a heavier filament, a Z-3 or an S-3 construction will fish cleaner, be more elastic, pick faster, and generally handle better. The heavier filaments will also have a slightly greater stretch at low loadings.

The popular center-cored nets were introduced by a Japanese firm, which has exclusive Canadian and United States patents. Another popular net is the 24-filament resin- or plastic-coated one. These coatings add abrasion resistance and generally eliminate wet strength loss by binding the filaments together. The weight and amount of the coatings directly govern the effective life of the coating.

Because of the cost of 6- and 7-filament nets, 24-filament nylon has been commonly used for seine webbing. The smaller nylon filaments are interwoven with strands of a polymer to produce a stronger, stiffer, more attractive netting.

2.117

wheelhouse is placed amidships to provide greater visibility and easier access to the aft deck. Forward are the crew's quarters. The trawler has a wooden deckhouse and a planked deck; the latter has been covered with fiberglass, which seals the wood and provides a nonslippery surface. The insulation of the hold is covered with metal lath and cement. The ship's mechanical equipment includes a salt-water ice machine with output of 1 ton per day.

The motor car, which was built by graduates from the Moscow Aviation Institute, is already being used for prospecting, underwater photography, archaeological research, oceanology, and underwater construction. The builders hope that this model will be the prototype for the development of underwater vehicles that serve specific needs. [Abstracter: L. Baldwin]

2.12 (Cross Reference: 9.11)

CARRIAGE FOR THE UNDERWATER WORKER

Anonymous
New Scientist 39, No. 616, 603 (September 19, 1968)

The Russians have developed an underwater motorcar that resembles a small two-seater airplane without wings--it has a tail. The cabin is made of fiberglass that is reinforced with plastic. Two reversible electric engines enable the car to turn 90 degrees to the left or the right on its own axis. The car weighs 60 kg., has a maximum speed of 5 knots and an economic speed of 2 knots, and can operate under water for 90 min. at a depth of 20 m. Its maximum depth of submersion is 50 m.

2.05

Unirradiated and 0.1-Mrad irradiated haddock fillets often gave nonspecific toxicities. Samples given 0.2-Mrad radiation did not produce nonspecific toxicities. Death of mice due to nonspecific toxicities was more common between 24 and 48 hours but sometimes occurred within 24 hr. after injection. Symptoms and reaction patterns suggested a septicemia.

Cultures of the heart-blood from mice showing nonspecific symptoms indicated an infectious process. Among 23 isolates from the blood 8 were Proteus vulgaris, 2 P. morganii, 1 P. rettgeri, 1 Providence subgroup B, 2 Aerobacter aerogenes, 1 Actinobacillus, 3 enterococci, 1 Alcaligenes marshalli, and 4 Erysipelothrix insidiosa. The E. insidiosa, Aerobacter, and Providence groups, and most of the Proteus isolates were infectious for mice when injected peritoneally. The enterococci, Alcaligenes, and Actinobacillus isolates were not infectious and are probably secondary invaders.

A pour-plate technique with TPY agar was used to test the sensitivity of each isolate to novobiocin, chloramphenicol, erythromycin, lincomycin, neomycin, penicillin, dihydrostereptomycin, and tetracycline. Nonspecific toxicities were avoided in botulinum toxin assays by protection of mice with chloramphenicol and oxytetracycline.

3.15

was 3.65. The authors concluded that the raw, nonirradiated shrimp contained no detectable thiaminase.

The table shows the PER values and the corresponding protein quality values for the reference casein, whole egg solids, nonirradiated and irradiated shrimp. A statistical analysis of PER values for individual rats was carried out to obtain the maximum amount of information from the results. The variance for the treatment times replication interaction was not significant; however, the variance for treatment and for replications turned out to be significantly large at $P < 0.01$. The variance for treatments was significantly large only because the mean PER value for casein of 3.13 was significantly lower than any of the other treatment mean PER values. The mean PER values for all the samples were statistically equal.

			Shrimp			
			Nonirradiated		Irradiated at:	
	Casein	Whole-egg solids	Raw	Cooked	0.15 Mrad	0.30 Mrad
Protein efficiency ratio	3.13	3.76	3.67	3.72	3.76	3.72
Mean protein quality	100	120	117	119	120	119

2.117 (*) BOOK ON FERRO-CEMENT BOATBUILDING SPURRED BY HUNDREDS OF QUESTIONS

Nesbitt, E. T.
National Fisherman 49, No. 5, 12C, 21C (August 1968)

John Samson, the first person to build a ferro-cement yacht in Canada, has formed a new company in Vancouver, British Columbia, that not only will be designing ships with ferro-cement hulls but will be distributing books and information on ferro-cement construction. The most comprehensive of the books is "How To Build a Ferro-Cement Boat." It is available for $9.75 from Samson Marine Design Enterprises Ltd., P.O. Box 98, Ladner, B.C., Canada.

Samson's new book answers many questions in detail. For example, it describes the formulation of the plaster of sand, cement, and pozzolana clay. They are combined in the ratio of 2 parts sand to 1 part cement, with 15 pounds of clay being added for every bag of cement. Certain requirements must be met by the ingredients--the sand must be sharp, fine, silica sand that can pass through a No. 8 sieve; the cement should be No. 5 Portland cement. The final mixture should be not too wet to hold shape or prove watertight when dry and yet not so dry that lumps will appear in the hull.

The advantages claimed for the new ferro-cement hulls are low cost, durability, low maintenance, and quick construction. The hull and deck structure of a 45-ft. ketch can be built for about $1,500. One ferro-cement yacht has sailed

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 ABSTRACTER: S. G. Cordell

2.15 VACUUM EVISCERATION
A MODERN METHOD OF CLEANING FISH AT SEA

Connors, Thomas J., and Daniel W. Baker (Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Massachusetts 01930)
Commercial Fisheries Review 30, No. 7, 39-41 (July 1968) (Separate No. 819)

The Bureau of Commercial Fisheries has developed a prototype vacuum eviscerator for cleaning fish at sea. This paper compares the present system of cleaning fish with the new system and outlines the advantages of the new system.

Vacuum evisceration and flushing provide the following advantages. (1) The size of the crew on larger vessels can be reduced by three men, resulting in more income per man and releasing experienced men for work on other vessels. (2) The equipment can be so placed that the men can work in a convenient sitting or standing position. (3) Working conditions can be made safer because no fish or offal is deposited on the deck to cause dangerous, slippery footing. (4) Bacterial contamination can be reduced and quality can be improved because the fish do not have to be cut, and the visceral contents are effectively removed from the processing area. (5) The landing of higher quality fish benefit both industry and the consumer.

The operator pushes a fish onto the interchangeable nozzle and depresses the foot pedal to open the vacuum valve. The vacuum pulls out the viscera and deposits it in the vacuum tank-trap. By further depressing the foot pedal, the operator closes the vacuum valve and simultaneously opens the water-flushing

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 ABSTRACTER: M. F. Tripple

2.146 (*) ON SOME TECHNIQUES OF DETECTING SALMON BY THE ECHO SOUNDING METHOD.
I - ESTIMATION OF THE FISHING GROUNDS OF SALMON ACCORDING TO SWIMMING SPEED AND SWIMMING DEPTH CALCULATED FROM ECHO TRACES ON RECORDING PAPERS

Sano, Noritatsu (The Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 34, No. 8, 660-669 (August 1968) (In Japanese; abstract, figures, and tables in English)

Part I.--The author describes a method for estimating the potential of salmon-containing areas. Comparing information about the depth and speed that salmon swim, as calculated from the trace patterns of an echo sounder, with the results of salmon gill-netted during the recording, he found that the calculated distribution corresponds fairly well with the actual catch. He concludes that improvements in the use of the echo sounder will enable him to detect the distribution more accurately.

Part II - On the trial of horizontal fish finder for salmon. Ibid. 670-680.--The author used a horizontal fish finder and a vertical fish finder with wide ultrasonic beams and low oscillating frequencies (50 kc. and 28 kc., respectively) to look for salmon. The horizontal fish finder, with its transducer mounted on the sheer strake of the ship, was kept at a depth of 1 meter. It was put into the sea even in moderately rough weather. The echo pattern given by the horizontal fish finder was compared with that of the vertical fish finder, and the ability

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 ABSTRACTER: L. Baldwin

2.9A (*) DINOFLAGELLATE CROP IN THE NORTH SEA

Wood, P. C. et al.
Nature 220, No. 5162, 21-27 (October 5, 1968)

"Introduction"--P.C. Wood (Ministry of Agriculture, Fisheries and Food; Fisheries Laboratory; Burnham-on-Crouch, Essex, England).
A chronological table summarizes the principal events occurring between April 19, when CPR's (continuous plankton recorders) revealed the first signs of Gonyaulax tamarensis, through August 20, when the concentrations of toxin in shellfish had decreased enough to warrant removal of the ban on gathering mussels (Mytilus edulis), scallops (Pecten maximus), and cockles (Cardium edule).

"Distribution of Gonyaulax tamarensis Lebour in the western North Sea in April, May, and June 1968"--G. A. Robinson (Scottish Marine Biological Association; Oceanographic Laboratory; Edinburgh, Scotland).
CPR's towed at a depth of 10 m. by merchant ships traveling along a number of standard routes catch plankton on a band of silk that has 60 meshes to the inch. The samples are then preserved in formaldehyde till they can be analyzed. Analysis of samples taken east of the Firth of Forth in mid-April showed cell counts of between 10,000 and 20,000 per sample. The toxic dinoflagellate spread southeastward till at the peak of the incident, in mid-May, cell counts reached 240,000 per sample. This number represents at least 10,000 cells of G. tamarensis per liter. [9 references]

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 ABSTRACTER: L. Baldwin

2.146

of each to distinguish salmon echoes from echoes of miscellaneous origin was evaluated.

The echo patterns recorded by the horizontal fish finder showed that very few noise traces were picked up near the surface; each single echo could be distinguished. Recording the horizontal echo and the oblique echo on separate papers made it more convenient for the author to distinguish the echo patterns. The author concludes that using a horizontal fish finder with a vertical fish finder makes estimation of the potential of salmon fishing grounds more effective.

2.9A

"Mortality of Shags and other Sea Birds caused by Paralytic Shellfish Poison" --J. C. Coulson, G. R. Potts, I. R. Deans, and S. M. Fraser (Department of Zoology; University of Durham, England).

Of the 636 birds found dead along the coast of Northumberland and North Durham, shags (Phalacrocorax aristotelis) predominated. No other species had a mortality rate of more than 5 percent. Postmortem examination, as well as observations of the symptoms of dying birds, pointed to a neurotoxin as the cause of death; it produced no evidence that either pp'DDE or dieldrin could have been.

Shags and terns (Sterna sp.) were the first birds to die; cormorants (P. carbo) died over the greatest span of time. Offshore feeders--puffins (Fratercula arctica) and kittiwakes (Rissa tridactyla)--and birds that feed mainly inland in spring--for example, the black-backed gull (Larus fuscus)--escaped extensive mortality. Very few eider (Somateria mollissima) died, despite the fact that they feed basically on mussels, which contained by far the highest levels of toxin found in any of the shellfish. The authors hypothesize that this species of bird has some means of reducing the toxic effects of poison.

(Continued on Card 2.9B)

2.3 METHOD AND APPARATUS FOR OPENING UP THE REAR PORTION OF THE BELLY SIDE OF FISHES

British Patent 1,073,779
Abstracts from Current Scientific and Technical Literature 20, No. 9, Abstract No. 2130 (September 1967)

This equipment, used to open fish bellies, is suitable for processing all types of fish.

2.9 MARINE TOXINS FROM THE PACIFIC. I - ADVANCES IN THE INVESTIGATION OF FISH TOXINS

Banner, Albert H. (Univ. of Hawaii, Honolulu, Hawaii)
Chemical Abstracts 68, No. 8, 6739h (April 8, 1968)

2.117

from Australia to Victoria, proving its durability. Another hit a submerged rock at a speed of 12 knots with no damage to the hull. The cement hulls require little maintenance and can be left in water throughout the winter if not exposed to ice. A 42-ft. towboat has been in service for 6 months with no visible signs of leakage; a 42-ft. commercial fishing troller has been built. At present, a 60-ft. fish storage barge with a double hull is being constructed. It will hold 120,000 pounds of fish, have its own refrigeration equipment, and be towed to fishing grounds by other vessels.

Each month the staff at the firm's Ladner address issues new booklets and bulletins, most of which include drawings, sketches, and photographs showing hull design, frame structure, engine mountings, interior layout, fuel tanks, water tanks, and cabin details. One of the booklets already issued is entitled "C-Horse, 38-foot Salmon Troller." A small fee is charged for these booklets.

2.15 FISH FACTORY ON THE HIGH SEAS

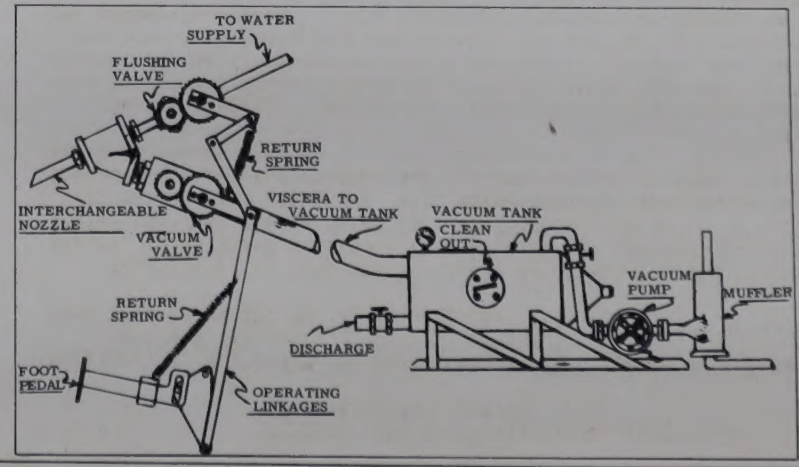
Welke, R.
Lebensmittel Ind. 14, No. 12, 453-457 (1967)
Food Science Abstracts 2, No. 4, Abstract No. 68/431, p. 149 (April 1968)

The processing of fish at sea is discussed and some of the equipment used for this purpose is described with illustrations. The layout of the equipment is shown diagrammatically.

2.15

valve. When water overflows the visceral cavity, he closes the flushing valve, opens the vacuum valve to remove the flush water, and releases the foot pedal to shut off the system.

Under normal working conditions with the present method, about 16 fish can be gutted and washed in 1 min. This averages out to 400 pounds of fish per hour per man. With vacuum evisceration, a fish could be cleaned and flushed in about 10 sec. during continuous operation. One man can eviscerate and flush 900 lb. per hr.



A device for cleaning the visceral cavity of fish

APPARATUS FOR OPENING FISH BELLIES (BR. PAT. 1,073,779)

PROCESSING FISH AT SEA

TOXINS FROM PACIFIC MARINE LIFE

2.9B DINOFLAGELLATE CROP IN THE NORTH SEA

Wood, P. C. et al.
Nature 220, No. 5162, 21-27 (October 5, 1968)

"Biological Observations Associated with the Toxic Phytoplankton Bloom Off the East Coast"--J. A. Adams and D. D. Seaton (Department of Agriculture and Fisheries for Scotland; Marine Laboratory; Aberdeen); J. B. Buchanan and M. R. Longbottom (Dove Marine Laboratory; Cullercoats; North Shields; Northumberland, England).

About 2 weeks after the first dying sea bird was found, dead sand eels (Ammodytes sp.) were caught by trawlers just south of the Farne Islands and were found washed up on the beaches. Along the shore, large numbers of dying Venus striatula (da Costa), edible cockles, ragworms, and Macoma balthica L. were also found. Scallops and mussels, though highly toxic, showed no signs of mortality. Gonyaulax tamarensis, Peridinium depressum Bailey, and G. polyedra Stein were isolated in the CPR samples. Thus the authors concluded that other toxic species may have contributed to the incidents of death. They therefore recommend further investigation of the concentration of toxins by planktonic herbivores, a link in the food chain.

"Distribution of Toxin in Molluscan Shellfish following the Occurrence of Mussel Toxicity in North-East England"--H. R. Ingham, Public Health Laboratory, General Hospital, Westgate Road, Newcastle-upon-Tyne, England; James Mason, Department of Agriculture and Fisheries for Scotland; P. C. Wood.

On May 30 and 31, 79 patients with symptoms of paralytic shellfish poisoning were admitted to the Royal Victoria Infirmary, Newcastle-upon-Tyne. Most of

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 ABSTRACTER: L. Baldwin

3.2349 (*) TEXTURAL AND RECONSTITUTIONAL PROPERTIES OF FREEZE-DRIED SHRIMP

Moorjani, M. N., and N. P. Dani (Central Food Technological Research Institute, Mysore-2, India)
Food Technology 22, No. 7, 74-76 (July 1968)

Relatively few data are available on changes in the texture of freeze-dried shrimp. This paper describes the textural and reconstitutional properties of shrimp that was freeze dried in a fresh condition or after mild blanching. Textural changes are correlated with water-holding capacity and histological studies. Samples of air-dried shrimp were included for comparison to point out the advantages of freeze-drying.

Shrimp (Peneaus indicus) was freeze dried at a platen temperature of 45° C. in a laboratory freeze-drying unit; total drying time was 12 hours. The moisture content of the dried product was 3.0 percent. Histological examination of sectionsfrom air-dried shrimp showed that the bundles were compacted, obliterating the endomysial spaces. In sections of freeze-dried shrimp, an extensive space system was formed and the muscle bundles had shrunk considerably. The poor degree of rehydration in the case of air-dried shrimp was attributed to gross irregular shrinkage. The cross striations were distinct in longitudinal sections from both fresh and freeze-dried shrimp.

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 ABSTRACTER: M. F. Tripple

3.15 (*) ESTIMATION OF RADIATION RESISTANCE VALUES OF MICROORGANISMS IN FOOD PRODUCTS

Anellis, Abe, and Stanley Werkowski (Microbiology Division, Food Laboratory, and Quality Assurance Office, U.S. Army Natick Laboratories, Natick, Massachusetts 01760)
Applied Microbiology 16, No. 9, 1300-1308 (September 1968)

Several statistical methods were evaluated for estimating radiation resistance values of five strains of Clostridium botulinum by use of partial spoilage data from an inoculated ham pack study. Preferred procedures were those based on quantal response. The probit maximum likelihood determination was used as a standard of comparison.

Weibull's graphical treatment was considered the best of the graphical methods, for it is simple, mathematically sound, and gives LD_{50} values (the dose at which 50 percent of the sample units are negative--such as nonswollen, nontoxic, or sterile) close to those of references. Additionally, it gives a means of analyzing the types of microbial death kinetics that occur in the pack, and of predicting the probability of microbial death with any radiation dose used, as well as the dose needed to destroy any given number of organisms, without the need to assume the death pattern of the partial spoilage data. It also permits prediction of the dose needed to destroy any given number of organisms, and it does not require an assumption of the death pattern of partial spoilage data.

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 ABSTRACTER: S. G. Cordell

3.237 (*) REMOTE HEAT FISH FRYER SPEEDS COOKING, ELIMINATES HOT SPOTS, REDUCES FATTY ACIDS

Anonymous
Quick Frozen Foods 31, No. 2, 59-60 (September 1968)

A new cooker that uses an indirect heat-transfer system for precooking fish has been developed. The cooker is operated by a company that breads and precooks a variety of fish and fish cakes. An official of the company states that the cooking equipment has given excellent results.

The heat-transfer fluid, which is fire resistant, is electrically heated to less than 500° F. in a remote heater instead of to the 1,500° F. usual in direct-fired heater tubes. Pumps carry the fluid to stainless-steel coils submerged in the frying oil. This oil is maintained at 400°±3° F. by a controller that senses the temperature of the oil and regulates the flow of the heat-transfer fluid accordingly.

The cooking oil is constantly filtered during the cooking process; an auger removes crumbs. The auger and filter areas are relatively cool, so chances of burning and acid formation are reduced. While the cooker is being cleaned, the oil is run through a micron filter and pumped into a holding tank. The overall processing cycle requires a little over 15 min.; the cutting, breading, and cooking takes less than a minute.

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 ABSTRACTER: S. G. Cordell

DINOFLAGELLATE CROP IN THE NORTH SEA

RADIATION RESISTANCE OF CLOSTRIDIUM BOTULINUM

PROPERTIES OF FREEZE-DRIED SHRIMP

FISH PRECOOKER

3.15 (Cross Reference: 2.05)

The Weibull treatment indicated a normal type death kinetics for C. botulinum spores in irradiated cured ham rather than an exponential order of death assumed by the Schmidt-Nank formula. The Weibull 12D equivalent of a radiation process--that is, the minimal radiation dose (MRD)--for cured ham was consistently higher than the experimental sterilizing dose (ESD) or the Schmidt-Nank average MRD. The author suggests that the Schmidt-Nank MRD is somewhat unrealistic, for in three cases out of the five examined it was lower than the ESD.

The arithmetic technique favored was the Spearman-Kärber estimate, for it is easy to compute, it agrees with the reference method, and it readily provides confidence limits for the LD_{50} values. [23 references]

3.15 IRRADIATION OF FISHERY FOODS

Tozawa, Harumi (Tokai Reg. Fish. Res. Lab., Kachidoki, Chuo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 34, No. 8, 740-755 (August 1968) (In Japanese; figure and tables in English)

This article contains three tables showing (1) the optimum irradiation dose for eight kinds of fish and four kinds of shellfish aerobically packed in hermetically sealed cans, (2) the storage time and temperature for five kinds of fish and four shellfish irradiated and packed either in air or in a vacuum, and (3) the radiation dose required to control various fish-associated microorganisms; one figure showing the change in microbial count and flora in Dover sole as a result of changing irradiation dosage; and 139 references.

[Abstracter: L. Baldwin]

3.237 (Cross References: 3.3.235, 3.236)

Three advantages of the cooker are mentioned: (1) the higher than average temperature cooks the breading so quickly (20 sec.) that the center of the fish remains frozen--thus freezing time is reduced and, according to the company, the fish retains more of its natural moisture; (2) the indirect heat-transfer system eliminates hot spots and does not burn the breading--thus the oil keeps clean and fatty-acid formation is minimized; (3) only 225 gallons of oil is necessary, so, even at minimum production, oil is used up faster than fatty acids are formed --thus the need to throw out oil is totally eliminated.

3.235 VOLATILE CARBONYL COMPOUNDS OF KATSUWOBUSHI

Nonaka, Junsaku, Haruo Kawakami, and Chiaki Koizumi (Tokyo Univ. of Fish., Konan-4, Minato-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 34, No. 8, 712-715 (August 1968) (In Japanese; abstract, figures, and table in English)

Katsuwobushi, which is made from skipjack that has been boiled and smoked, is commonly used in Japan as a soup stock. The carbonyl compounds of this molded fish product were converted into 2,4-dinitrophenylhydrazone derivatives and analyzed by gas chromatography. Formaldehyde, acetaldehyde, propionaldehyde, iso-butyraldehyde, iso-valeraldehyde, caproaldehyde, methylamylketone, and methyl-hexylketone were identified.

[Abstracter: L. Baldwin]

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the patients had eaten mussels that had been gathered from Holy Island and Budle Bay and cooked by a retailer; a few of the mussels were home cooked.

The authors estimated the amount of toxin in the cooked mussels by simmering batches of whole mussels in their own juice for 20 min. and washing the meats for 5 min. in running water. They also determined the level of toxin in raw mussel and in cooked, unwashed meats. Toxicity was expressed as mouse units per 100 g. of tissue, one mouse unit being the amount of toxin that, when injected intraperitoneally, would kill a 20-g. mouse in 15 min. The amount of toxin in these shellfish ranged from 10,062 to 20,800 mouse units per 100 g. of raw tissue.

The cooking tests showed that 60.5 percent of the original toxin was present after the mussels had been cooked for 20 min.; the juice contained 32 percent and the meats 28.5 percent. One raw mussel weighing about 6 g. contained an average of 1,750 units of toxin; after it was cooked for 20 min., it contained about 500 units. Washing the meat in running water for 5 min. did not reduce the amount of toxin further.

By the middle of June, the geographic extent of toxicity had been established by an examination of mussels taken from representative points along the east and west coasts of England and Scotland. The seaward extent of toxicity was determined by examination of scallops, both Pecten maximus and Chlamys opercularis. The toxicity covered more than 300 miles of eastern coastline, from Rosehearty to Flamborough Head, and extended at least 7 miles offshore. Toxin was present in all but one mussel sample that had been collected between Rosehearty and Bridlington. Values of more than 20,000 units per 100 g. occurred in samples gathered at Eyemouth, Holy Island, Alnmouth, and Blyth. Scallops from the Farne Bank contained 7,840 units per 100 g., and those from off Flamborough Head contained 1,280 units per 100 g. (400 units per 100 g. is the maximum concentration of toxin permitted in North American shellfish.) [13 references]

3.2349

Taste panel studies indicated very low acceptability for texture evaluation of the conventional air-dried shrimp. Freeze-dried shrimp were far superior to air-dried shrimp in quality, but they were slightly inferior to fresh shrimp.

Although the rehydration ratio for freeze-dried shrimp was 5 times, as compared with 1.2 for air-dried shrimp, about one-third of the water could be easily expressed from the rehydrated freeze-dried shrimp by applying slight manual pressure. The rehydrated shrimp shrank considerably on cooking, and the texture was rather tough as compared with fresh shrimp. Shrimp that were freeze-dried after mild blanching produced a finished product with an attractive pink color and that occupied little space. The astacene pigment faded noticeably during storage. Shrimp freeze-dried when fresh had greater eye appeal because they retained their original size and shape. They also had better flavor, though their texture deteriorated during storage. [18 references]

3.2349 THE PROTAN FREEZING METHOD (FREEZING IN ALGINATE JELLY)

Anonymous
Norwegian Fishing and Maritime News 15, No. 1, 21, 23 (1968)

3.2491 STUDIES ON THE DISCOLORATION OF RED FISHES. V - ENZYME INVOLVED IN THE DISCOLORATION OF CAROTENOID PIGMENTS IN FISH SKIN TISSUES

Tsukuda, Nobuo, and Keishi Amano (Tokai Regional Fisheries Research Laboratory, 5-5, Kachidoki, Chuo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 34, No. 7, 633-639 (July 1968)

In 1967, the authors concluded that the discoloration of carotenoid pigments in the raw skins of some marine red fishes was caused by an enzyme in the tissues. They based their conclusion on the fact that both heat and potassium cyanide inhibited the discoloring action. The nature and degree of fading are important in terms of practical measures for preventing discoloration of the fish product; therefore they have attempted here to determine the nature and the specificity of the enzyme activity in the aqueous extracts of dried skin from which the lipids have been completely removed. In addition, they have examined the effect of the fishes' freshness on the discoloring activity.

Skin homogenates from fresh gurnards (Chelidonichthys kumu) were stored for 1-9 days at 5°-7° C., and the rate of discoloration was correlated with organoleptic observations of freshness. Discoloration proceeded noticeably until the third day of storage, at which time the fish were considered in good condition. But as deterioration progressed, the discoloring action decreased appreciably, until finally, when the tissues were considered completely spoiled, discoloration ceased.

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 ABSTRACTER: L. Baldwin

4.11 (*) AN IMPROVED METHOD FOR THE QUANTITATIVE ANALYSIS OF LIPID CLASSES VIA THIN-LAYER CHROMATOGRAPHY EMPLOYING CHARRING AND DENSITOMETRY

Nutter, L. J., and O. S. Privett (The Hormel Institute, University of Minnesota, Austin 55912)
Journal of Chromatography 35, No. 4, 519-525 (July 1968)

Although TLC (thin-layer chromatography) using densitometry and other techniques to measure the charred spots offers a simple, fast micromethod for analysis of lipid classes, a completely satisfactory method for the quantitative analysis of these compounds has not been developed. The basic problem with the present techniques lies in the charring process. No single technique can be expected to produce a quantitative carbonization of all the compounds found in natural lipids. Thus, the method of necessity must remain empirical, and considerable reliance must be placed on the use of standards. Because of the complexity of natural lipids, however, identical standards are not generally available, so something less than perfect must be used. Some factors are more important than others in regard to the carbon yield in the charring process. Most lipid classes are relatively nonvolatile, so the degree of unsaturation of the constituent fatty acids is quite important. Hydrogenation may be used to nullify the degree of unsaturation and simplify the selection of standards when they are needed.

A procedure for the quantitative analysis of lipid classes is described. The method uses TLC via charring and densitometry in which the effect of unsaturation is eliminated by hydrogenation. The sample is hydrogenated in ethanol at room temperature using the Adams catalyst. Quantitative analysis is done by fractionation of the sample on thin-layer plates and analysis of charred spots

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 ABSTRACTER: M. F. Tripple

3.2494 EFFECT OF STORAGE TEMPERATURE ON THE MICROFLORA OF IRRADIATED AND NONIRRADIATED VACUUM-PACKAGED PETRALE SOLE FILLETS

Pelroy, Gretchen A., and John P. Seman, Jr. (Bureau of Commercial Fisheries Technological Laboratory, Seattle, Washington 98102)
Journal of Milk and Food Technology 31, No. 8, 231-236 (August 1968)

Spoilage microflora of irradiated fishery products stored at refrigeration temperatures are known to be significantly different from those of nonirradiated products. Because storage of irradiated seafoods at relatively high temperatures can adversely affect the sanitary quality of the fish, the authors examined the effect of storage temperature on irradiation-pasteurized petrale sole fillets by measuring the total bacterial count and the outgrowth of coliforms, enterococci, and coagulase-positive Staphylococcus aureus.

Vacuum packaged in mylarpolyethylene bags, petrale sole fillets were irradiated at 0.0, 0.1, 0.2, and 0.3 Mrad and stored at 0.5°, 3.3°, 5.6°, 7.8°, 10.0°, 15.6°, and 22.2° C. The samples were analyzed at periodic intervals up to the maximum storage life of the fillets.

Initial bacterial counts were reduced about 1 log cycle for every 0.1 Mrad increment of irradiation. At spoilage, total bacterial counts were in the range

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 ABSTRACTER: S. G. Cordell

4.14 (*) STUDIES ON THE MINOR CONSTITUENTS OF WHALE OILS. I - IDENTIFICATION OF 2,6,10,14-TETRAMETHYLPENTADECANE AND 2,6,10,14-TETRAMETHYL-2-PENTADECENE IN SPERM BLUBBER OIL

Sano, Yoshihiko (Research Laboratory, Miyoshi Oil and Fat Co., Ltd., 4-chome, Horikiri, Katsushika-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 34, No. 8, 726-733 (August 1968) (In English)

In 1935, Toyama et al. identified one of the constituents of sperm-whale oil as pristane, a saturated polyisoprenoid hydrocarbon. The molecular formula was assumed to be $C_{18}H_{38}$. In 1949, Sorensen et al. determined that the structure of pristane isolated from the liver oil of basking shark was 2,6,10,14-tetramethylpentadecane ($C_{19}H_{40}$). Then, in 1965, Blumer and Thomas found that of the three isomeric C19 olefins with the carbon structure of pristane they had isolated from the liver oil of sperm whale, 2,6,10,14-tetramethyl-2-pentadecene predominated by about 10 to 1. The present paper describes the separation and identification of multibranched-chain hydrocarbons (with the carbon structure of pristane) that were isolated from the blubber oil of an adult sperm whale (Physeter macrocephalus)

The multibranched-chain hydrocarbon isolated by column chromatography had an equivalent chain length value of 16.7 on the polyethylene glycol adipate column. This hydrocarbon was identified as pristane by gas-liquid chromatography, infrared

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 ABSTRACTER: L. Baldwin

3.2494 (Cross Reference: 3.15)

of 10^7 to 10^8 bacteria per gram regardless of the irradiation dose and storage temperature.

Lactic acid bacteria were the predominant spoilage organisms in the irradiated fish stored at all experimental temperatures. Pseudomonas species were the predominant bacteria at time of spoilage of the nonirradiated fish stored at 5.6° C. and lower; at storage temperatures above 5.6° C., the spoilage flora were predominantly lactic acid bacteria. Although growth of coliforms and enterococci was suppressed by irradiation treatment of the petrale sole fillets, these organisms did show growth at the higher storage temperatures. No coagulase-positive Staphylococcus was found in any of the irradiated petrale sole samples.

4.14

analysis, high resolution nuclear magnetic resonance, and mass spectometry. A component in the unsaturated branched-chain hydrocarbon fraction was tentatively identified as 2,6,10,14-tetramethyl-2-pentadecene; the existence of phytadiene was assumed. [25 references]

II - Polyunsaturated fatty acids and alcohols in sperm blubber oil. Ibid. 734-739. Highly unsaturated fatty acids and alcohols were separated from the blubber oil of sperm whale (Physeter macrocephalus) by urea-complex fractionation combined with silicic acid column chromatography. They were then characterized by gas-liquid chromatography, thin-layer chromatography, and infrared analysis.

The author found the following polyunsaturated fatty acids 18:4, 20:4, 20:5, 21:5, 22:5, and 22:6; and alcohols 18:4, 20:4, 20:5, and 22:6. He also observed other minor unknown constituents. [11 references]

4.13

FATTY ACID COMPOSITIONS OF OIL FROM 33 SPECIES OF MARINE FISH

Ueda, Tadashi (Shimonoseki Univ. Fish., Shimonoseki, Japan)
Chemical Abstracts 69, No. 7, 25305r (August 12, 1968)

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via densitometry. Elimination of unsaturation gives more uniform charring properties and simplifies the selection of reference standards when needed. The method is tested on standard mixtures of reference compounds. [17 references]

[Abstracter: M. F. Tripple]

peak area.

In gas chromatography, the difficult to evaluate when the small peak of the minor component appears poorly separated from the large peak of the major component. The authors found that, by using synthetic samples of a mixture of cholesterol and cholestanol, the derivative method would give a calibration curve with a linearity and reproducibility that are much better than those of calibration curves of reference standards when needed.

Kambara, Tomihiro, and Kotaki Satoh (Department of Chemistry, Faculty of Science, Hokkaido University, Sapporo, Japan)
Journal of Chromatography 35, No. 3, 318-322 (June 18, 1968)

4.11

DERIVATIVE GAS CHROMATOGRAPHY APPLIED TO THE MICRODETERMINATION OF THE POORLY RESOLVED COMPONENT

FATTY-ACID COMPOSITION OF FISH LIPIDS

DERIVATIVE CHROMATOGRAPHY OF A POORLY RESOLVED COMPONENT

4.15 INCORPORATION OF ACETATE-I-^{14}C INTO GLYCERYL ETHERS OF LEOPARD SHARK LIVER OIL

Kayama, Mitsu (Department of Fisheries, Hiroshima University, Fukuyama, Japan), and Yasuhiko Tsuchiya
Bulletin of the Japanese Society of Scientific Fisheries 34, No. 7, 640-645 (July 1968)

In a previous experiment on the incorporation of acetate-1-^{14}C into the various lipids of liver oil extracted from the leopard shark (Triakis scyllia [scyllium]), the authors found that the glyceryl ethers fractionated from the unsaponifiable materials were somewhat radioactive. The incorporation of ^{14}C-labeled acetate into the long chain alkyl moiety of the glyceryl ethers indicated that the shark not only accumulates these compounds from its diet but also synthesizes them de novo. In the present paper, they report on the distribution of activity from radioactive compounds that are synthesized by the shark.

A 904-gram leopard shark was given a 0.5 m.c. (millicurie) intraperitoneal injection of sodium acetate-1-^{14}C, left in the aquarium for 5.5 hr., and then killed by freezing. Oil was extracted from the liver, and the pure glyceryl ethers were separated from the unsaponifiable materials by silicic acid column chromatography. The glyceryl ethers, in turn, were separated into soluble and insoluble fractions by low-temperature crystallization. The radioactivity of the soluble fractions was then derived by permanganate oxidation, that of the

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 ABSTRACTER: L. Baldwin

4.80 ESTERS OF THE POLYGLYCEROLS PART II - NEW FOOD MATERIALS

Babayan, Vigen K. (Research-Development and Quality Control, Stokely-Van Camp, Inc.)
Food Product Development 2, No. 3, 84, 86, 90 (June-July 1968)

In Part I, the author discussed the polyglycerols as unique raw materials that could be used as building blocks for tailor-made fats and fatty derivatives. In this Part, he discusses polyglycerol esters and suggests some broad applications for these technologically versatile derivatives.

Converting completely water-soluble polyglycerols into their more lipophilic esters requires that one or more of the hydroxy groups of the polyglycerol be esterified and some lipophilic characteristics be added thereby to the hydrophilic molecule. Of the polyglycerol esters, the mono- and diesters, being closer to the polyglycerol, are more hydrophilic; the polyesters, being closer to the oils, are more lipophilic.

Polyglycerols become surface-active agents, wetting agents, emulsifiers, and coupling agents whether they are used in cooked foods, food emulsions, toppings, or any other oil-water system; they function the same way in medicinal, pharmaceutical, or cosmetic formulations. The polygylcerol esters, by lowering the interfacial tensions and barriers between the oil and water constituents, likewise

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 ABSTRACTER: L. Baldwin

4.29 DISTRIBUTION AND FATTY ACID COMPOSITION OF PHOSPHOGLYCERIDES IN NORMAL HUMAN BRAIN

Svennerholm, Lars (Department of Neurochemistry, Psychiatric Research Center, University of Gothenburg, Gothenburg, Sweden)
Journal of Lipid Research 9, No. 5, 570-579 (September 1968)

The aim of this work was to develop a rapid, simple method for analyzing a large number of brain samples. The author tested the method by using it to establish the amount and the fatty-acid composition of the phosphoglycerides in the gray matter and the white matter from human brains that ranged in age from 12 weeks (fetal) to 82 years.

Using a thin-layer chromatographic procedure, the author determined the fatty-acid composition of the choline, ethanolamine, inositol, and serine phosphoglycerides from 11 brains. The recovery of phospholipids from the chromatographic plates was 98±3 percent for ethanolamine phosphoglycerides and choline phosphoglycerides, ±5 percent for serine phosphoglycerides and sphingomyelins, and ±8 percent for inositol phosphoglycerides. The procedure is simple, rapid, and reliable; moreover it can be used for biopsy samples of from 10 to 20 mg.

Preliminary tests were made on samples of cerebral gray matter and cerebral white matter from the frontal, temporal, parietal, and occipital lobes. Except for slightly higher concentrations of serine and sphingomyelins and slightly lower concentrations of polyenoic fatty acids in ethanolamine and serine of the

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 ABSTRACTER: L. Baldwin

5.7 MEASUREMENTS OF LIPID PEROXIDATION AND α-TOCOPHEROL DESTRUCTION IN VITRO AND IN VIVO AND THEIR SIGNIFICANCE IN CONNEXION WITH THE BIOLOGICAL FUNCTION OF VITAMIN E

Diplock, A. T., M. A. Cawthorne, Elspeth A. Murrell, J. Green, and J. Bunyan (Walton Oaks Experimental Station, Vitamins Ltd., Tadsworth, Surrey, England)
British Journal of Nutrition 22, No. 3, 465-472 (September 1968)

In 1964 and 1965, Witting and his coworkers explained that vitamin E serves simply as a biological antioxidant that functions to prevent random, proliferating lipid peroxidation, which otherwise would extensively damage the tissue lipids and cellular structures. Using this antioxidant theory as a basis, they exhaustively studied the development of muscular dystrophy in the rat, concluding that the effect of unsaturated dietary fat in accelerating the onset of dystrophy was due to increasing lipid peroxidation and that in vitro lipid autoxidation and in vivo lipid peroxidation were kinetically comparable.

Rejecting the idea that generalized lipid peroxidation occurs in tissues in the absence of vitamin E and that α-tocopherol acts as a biological antioxidant, the present authors measured lipid peroxides in several tissues of the rat and studied the effect of vitamin E on them. Specifically, they investigated the relation between fatty-acid peroxidation and α-tocopherol in vitro and discuss, here, the significance of their findings relative to the biological function of vitamin E in vivo.

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 ABSTRACTER: L. Baldwin

RADIOACTIVITY OF GLYCERYL ETHERS FROM SHARK-LIVER OIL

FATTY-ACID COMPOSITION OF PHOSPHOGLYCERIDES OF BRAIN

FOOD POTENTIAL OF POLYGLYCEROL ESTERS

RELATION BETWEEN LIPID PEROXIDATION AND VITAMIN E

4.29

occipital lobe, variations between the different regions were within the range of acceptable error. Therefore, the lipid values were determined for gray and white matter from one region of the brain only. The results are considered valid for comparison with results for pathological material taken from various regions of the cerebral hemispheres.

The most striking finding was the small individual variations in the phospholipid distribution of mature brain. A table summarizes this finding for the cerebral tissue of the 11 brains analyzed. Eight additional tables give the fatty-acid composition of each of the four major phosphoglycerides analyzed from cerebral gray matter and cerebral white matter.

The author found a lipid-specific fatty-acid pattern for each of the four major phosphoglycerides. He concluded that the pronounced differences between fatty acids of the lipids from cerebral gray matter and those from the adjacent white matter justified his speaking of a tissue-specific fatty-acid pattern for brain phosphoglycerides. The phospholipids of cerebral white matter contained more monoenoic acid but far less polyunsaturated fatty acid than did the phospholipids of cerebral gray matter. The brain phosphoglycerides also showed an age-dependent fatty-acid pattern--as the age of the brain increased, the concentration of the fatty acids of the linolenate family increased; however, as age increased, the concentration of the fatty acids of the linoleate family decreased.

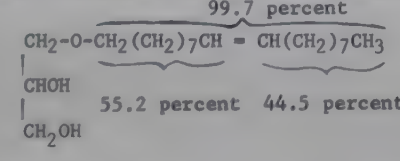
The inositol phosphoglycerides were characterized by a large concentration of arachidonate, which changed only slightly with age and was nearly as high for white matter as for gray. [30 references]

4.15

insoluble fractions by hydriodolysis. The results are tabulated below.

Fraction	Calculated main component	Radioactivity cpm/m mole
Insoluble glyceryl ethers	Chimyl alcohol	8999
Soluble glyceryl ethers	Selachyl alcohol	5745
Iodides	Cetyl iodide	8975
Monobasic acids	Nonanoic acid	2558

Assuming that the distribution of activity of the whole alkyl moiety in the glyceryl ethers was the same for both the chimyl and the selachyl alcohols, since no acetate is incorporated into the glyceryl moiety (Karnovsky and Brumm, 1955), the authors calculated the following percentage distribution as selachyl alcohol:



From this distribution, they concluded that the long chain alkyl moiety, with its higher activity on the ether side of the double bond, was totally synthesized from acetate. [26 references]

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The lipid peroxides in the pancreas, lung, adrenal, leg muscle, spleen, brain, small intestine, and uterus of 53 rats fed vitamin E-deficient diets and 54 rats fed vitamin E-supplemented diets were measured by a micro-iodimetric method and compared. Vitamin E deficiency did not increase the concentration of lipid peroxides in the tissues examined.

Because little was known about the kinetics of the oxidative decay of α-tocopherol in substrates of differing degrees of unsaturation, and because of the importance of these kinetics to the postulate that α-tocopherol functions as an antioxidant in vivo, the authors studied the decay of radioactive α-tocopherol during the inhibited peroxidation in vitro of methyl oleate, maize-oil methyl esters, and cod-liver-oil methyl esters. These ester preparations, each of which contained 100 μg. of (^{14}C)D-α-tocopherol per milliliter, were allowed to peroxidize at 90° C. under identical conditions. The decrease in tocopherols was plotted against the increase in the peroxide value of each ester and against time. The plots show that (1) the greater the degree of unsaturation of the substrate, the less the amount of tocopherol destroyed at any peroxide value attained before the end of the induction period; and (2) the greater the degree of unsaturation of the substrate, the greater the amount of tocopherol destroyed at any particular time before the end of the induction period.

Since the rate of depletion of body tocopherol levels is not affected by the content of polyunsaturated fatty acids in the diet, the authors postulate that the existence of vitamin E-deficiency diseases at varying tocopherol levels may be understood better in terms of an increased tocopherol requirement in animals that have been given increased amounts of unsaturated fatty acids. [20 references]

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serve as combining, coupling, solubilizing, or homogenizing agents for normally incompatible oil-water systems. Various polyglycerol esters that vary widely in their range of hydrophilic-lipophilic characteristics are used to create homogeneity in such systems. They add to the taste, appearance, and acceptability of foods and are of inestimable value in the formulation of medicines and pharmaceuticals. Because their molecular weight is higher and their volatility lower than that of the usual fats and oils, they are useful in such applications as stable lubricants, mold-release compounds, and plasticizers.

Polyglycerols can be likened to carbohydrates and the complete esters to fats and oils. The partial esters, then, are a sort of hybrid fat that falls somewhere between carbohydrates and fats, not only in their physical and chemical characteristics but in their caloric values as well. A mono- or diester of a polyglycerol can have all the appearance, taste, and uses of an oil yet have only from 5 to 8 calories per gram in contrast to 4 calories per gram for carbohydrates and 9.2 calories per gram for oils. It can also be given an oil-water compatibility that causes a dual behavior toward fat and water systems.

The partial esters formed from polyglycerols can become intermediates for reacting hydroxy acids. Derivatives of these acids can be used for emulsifiers, dough conditioners, bakery specialties, and yeast conditioners. By controlling the molar ratios of the fatty acid and the hydroxy acid, one can control the softening, penetrating, and solution-inducing properties of the polyglycerol mixed ester. Partial esters of polyglycerols can also become end products. In dietetic foods, for example, they can be made to taste and look like normal fats and oils while at the same time containing appreciably lower caloric values. When supplemented with protein, such foods can be tailor-made into a nutritionally balanced product.

6.197 (*) SELENIUM CONTENT OF FISH MEAL

Kifer, R. R., and W. L. Payne (Bureau of Commercial Fisheries, College Park, Maryland)
Feedstuffs 40, No. 35, 32 (August 31, 1968)

Fish meal, because of its selenium content, is of growing interest to the poultry industry. Thompson and Scott (1967) reported that selenium, together with vitamin E, sulfur amino acids, and synthetic antioxidants, aid in the curing and prevention of physiological disorders such as encephalomalacia, exudative diathesis, and muscular dystrophy. Scott suggested that vitamin E is conveyed and made more useful by selenium, sulfur amino acids, and antioxidants.

Research at Cornell points to selenium as a requirement in poultry diets for growth and survival. Breeding hens tested in field research developed an edematous condition of the head, reduced egg production, potentially reduced hatchability, and high mortality. Research has indicated that 0.05-0.1 p.p.m. of selenium is necessary in the diet of poultry, but selenium is extremely toxic at a level of 5-8 p.p.m. Therefore, to avoid an overdosage, poultrymen need a food that has a moderate amount of selenium but is much below the toxic level.

Fish meal appears to be such a food. The following table summarizes the findings from an analysis of 12 samples each of fish meals made from menhaden, Peruvian anchovetta, and Norwegian herring. (The neutron activation method was used for the determination of selenium 77.)

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ABSTRACTER: S. G. Cordell

6.55 MINNESOTA REPORTS RESULTS OF BEEF CATTLE EXPERIMENTS -- VALUE OF OYSTER SHELLS AND ALFALFA-BROME HAY IN FINISHING RATIONS FOR YEARLING STEERS

Meiske, J. C., and R. D. Goodrich (Department of Animal Science, University of Minnesota, Rosemount)
Feedstuffs 40, No. 42, 63 (October 19, 1968)

One of the reports given at the Minnesota Beef Cattle Feeders Day concerned the value of oyster shells as a replacement for alfalfa-brome hay in the finishing rations for cattle.

Five diets were formulated (according to a 2^5 factorial design) to contain one of the following as a distinguishing ingredient:

1. no roughage
2. 2.5 percent oyster shells
3. 2.5 percent oyster shells plus 7.5 percent ground alfalfa-brome hay.
4. 7.5 percent ground alfalfa-brome hay
5. 15 percent ground alfalfa-brome hay

All rations were mixed with coarsely rolled shelled corn, the primary ingredient, and with urea, the source of supplemental nitrogen (crude protein). All were formulated to provide equal average daily nutrient intakes of 2.5 lb. crude protein, 30 g. calcium, 25 g. phosphorus, 25,000 I.U. vitamin A, 0.10 lb. trace

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ABSTRACTER: L. Baldwin

8.8 RADIATION, PROCESSING AND STORAGE EFFECTS ON THE HEAD GAS COMPONENTS IN CLAM MEATS

Mendelsohn, Joseph M., and Richard O. Brooke (Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Massachusetts 01930)
Food Technology 22, No. 9, 112-116 (September 1968)

Volatile compounds, even in very low concentrations, may contribute significantly to the characteristic flavor and odor of fishery products. The purpose of this research was to identify the volatile components in the head gas from fresh meat of the clam (Mya arenaria); to determine the changes that occur in these components after irradiation, cooking, and storage; and to attempt to relate the presence of these compounds with organoleptic evaluations.

Samples were packed in cans in air and under vacuum. Vacuum-packed meats were irradiated at 350 Krads; air packed, at 450 Krads. Storage of all samples was at 33° F. The head gas components were removed from the clam meats by high-vacuum, low-temperature distillation. Analyses of components were made on a low-temperature programmable gas chromatograph and a rapid-scanning mass spectrometer. The authors refer to reports by Gadbois, D. F., Mendelsohn, J. M., and Ronsivalli, L. J., J. Food Sci. 32, 511-515 (1967) and Connors, T. J. and Steinberg, M. A., Food Technology 18, 113-116 (1964) for information on sample preparation, packaging, irradiation, and storage conditions. Otherwise, detailed information is given on procedures for head gas collection and concentration, gas chromatography, mass spectrometry, and analyses of sulfide sulfur.

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ABSTRACTER: F. T. Piskur

6.72 ANTINEOPLASTIC ACTIVITY OF CLAM-LIVER EXTRACT

Li, C. P., B. Prescott, and E. C. Martino (National Institutes of Health, Bethesda, Maryland)
Nature 219, No. 5159, 1163-1164 (September 14, 1968)

In 1964, M. R. Schmeer noted that extracts of clam (Mercenaria mercenaria) inhibited the growth of sarcoma 180 and Krebs 2 tumors in mice. At this time, the present authors had been studying the antimicrobial activity of the extracts of several species of mollusca for several years; therefore they decided to extend their study to include possible antineoplastic activity of extracts from clam. This communication reports their findings.

During their early work on the problem, the authors had extracted the tumor inhibitor from whole shucked clams. However, these extracts contained large quantities of extraneous matter that interfered with identification and purification of the active antitumor factor. But in 1967, Liu and Cipolla found that, although other parts of the clam body contain antiviral activity, the digestive diverticulum contains the most. So, since the liver is easily excised, it was chosen for this work.

Clam-liver extracts were prepared from fresh clams that had been frozen in the shell for 12 hr. or more and then thawed for about 1 hr. at room temperature. The powdered extract was suspended in saline or water just before it was used.

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ABSTRACTER: L. Baldwin

8.8 (Cross Reference: 3.15)

The highest concentration of components in the total volatile condensate appeared by about the 20th day of storage. Before and after the 20th day, the number and concentration of components were less. The compounds identified were: hydrogen sulfide, methyl mercaptan, dimethyl sulfide, diethyl sulfide, ethyl-n-butyl sulfide, acetaldehyde, acetone, isovaleraldehyde, valeraldehyde, hepatone, butene, 1-pentene, and toluene. Five of these 13 components are sulfides, and they represented about 80 percent of the total volatiles (exclusive of carbon dioxide and water). Dimethyl sulfide was the most dominant of the head gas components and appears to be the source of the typical clam odor.

Low-level radiation inhibited changes in the volatile compounds except for dimethyl sulfide. Appreciable changes in number and in concentration of the volatile compounds resulted from cooking of clams and subsequent storage at 33° F. In general, the combined effects of irradiation, cooking, and storage were not entirely clear, but they were definitely not additive.

6.72

Also, 10 percent suspensions of splenic tissue from leukemic mice were diluted 1:12 in a balanced salt solution, and 0.2 milliliters of the dilution (containing from 7×10^5 to 9×10^5 leukemic cells) was injected subcutaneously into the right hind leg of each mouse. This inoculum represented about 100 minimum lethal doses.

After the mice were injected with leukemic cells, some were given daily injections of the clam-liver extract in the left scapular region; others, which were used as controls, were either injected with a simple saline solution or left untreated. Results of a typical experiment are tabulated below. In this experiment, the treatment was begun 1 day after the leukemic cells had been implanted and was continued for 10 days.

No. of mice	Daily dose	MST*	Increase in MST
	mg/kg	Days	Percent
8	300	9.5	-5
8	250	14.0	40
8	200	13.0	30
8	150	11.5	15
8	100	12.0	20
8	50	10.5	5
20	0	10.0	0

*MST = mean survival time.

This table is typical of the results obtained from 30 positive antitumor tests run on from 30 to 60 mice per test with more than 10 preparations of clam-liver extract. The optimum dose varied from 70 to 250 milligrams per kilogram per day for treatments lasting from 3 to 10 days. When initial treatment was delayed until 5 days after leukemia implantation, the MST of the treated mice was similarly increased.

The authors do not suggest that clam-liver extract be used as an antileukemic drug for humans--(1) it is toxic, and (2) its activity cannot match that of currently available drugs, such as methotrexate. As a matter of fact, methotrexate was used for positive control in the mouse experiments; it usually increased the MST by 110 percent or more when the optimum dose was given from Day 1 to Day 7.

6.197

Sample	Selenium content of: Menhaden meal	Peruvian anchovetta meal	Norwegian herring meal
	p.p.m.	p.p.m.	p.p.m.
Average	2.22	1.39	2.78
Highest value	3.98	1.71	3.43
Lowest value	1.22	1.18	1.73

The selenium required by poultry can be supplied by including from 3 to 5 percent of fish meal in the diet.

6.55

mineralized salt, 10 mg. diethylstilbestrol, and 1.8 g. elemental sulfur. The calcium contributed by the oyster shells was not considered in arriving at calcium intakes.

The rations were fed to 200 yearling steers that had been randomly assigned to 10 pens, 20 steers to a pen. Half the pens were roofed, half had no roof. Two pens of steers, one under roof and one not, were fed randomly each of the rations.

After an unspecified amount of time, the following results were observed relative to the value of the oyster shells in the diets.

Cattle fed Diet 2 and 3 had average daily gains of 2.84 and 3.07 lb., respectively; those fed Diets 1, 4, and 5 had average daily gains of 2.88, 3.17, and 3.08, respectively. Cattle fed Diet 2 consumed less daily feed than did those fed the rations containing hay. When 2.5 percent oyster shell was included in the ration, 12 lb. less corn was needed per 100 lb. gain; 16.6 lb. of oyster shells were consumed instead. Feed costs were appreciably higher for cattle fed 15 percent hay than for those fed no roughage, 2.5 percent oyster shells, or 7.5 percent hay ($16.36 versus $15,80, $15.76, and $15.62, respectively); moreover, these cattle were less efficient in converting feed to gains--they required 626 lb. of shelled corn and 112 lb. of hay.

When rate of gain and feed costs per 100 lb. gain are considered, Diet 4, the ration containing 7.5 percent hay, was superior to all the others.

6.191 PRELIMINARY STUDIES ON THE DIGESTIBILITY OF ANCHOVY MEAL IN CHILE

Contreras, E., and C. Romo
Inst. de Fomento Pesquero, Publ. 12 (1965) (Santiago, Chile)
Journal of the Science of Food and Agriculture 17, No. 10, 11-193 (October 1966)

Pepsin digestibility of anchovy meal decreased as the meal dried. The decrease in digestibility was less if solubles and particularly if blood water was added to the press cake before it was dried. This protection persisted during storage. In unprotected meals, the digestibility decreased during storage but it could be increased by fine grinding of the meal prior to the pepsin test.

[Abstracter: F. Bruce Sanford]

DIGESTIBILITY OF ANCHOVY MEAL/

7.591 (*) AN ENZYMATIC (ESTERASE) METHOD FOR IDENTIFICATION OF ANIMAL AND FISH SPECIES

Thompson, Robert R. (Division of Food Chemistry and Technology, Food and Drug Administration, Washington, D.C. 20204)
Journal of the Association of Official Analytical Chemists 51, No. 4, 746-748 (July 1968)

A starch-gel electrophoretic method for separation of esterases in homogenates of skeletal muscle tissues was adapted to the histochemical identification of species of various fish and warm-blooded animals. Significant differences were found in the number and location of esterase bands to permit identification of the animal species. The esterase method can be applied in conjunction with the electrophoretic protein identification test for law enforcement purposes.

The fish species tested were tuna, bonito, snapper, grouper, cod, pollock, hake, and halibut. Five varieties of tuna gave identical patterns. The pattern for bonito differed from that of the tunas. The esterase system for snapper showed four bands, and grouper gave two bands. Varieties within these two groups did not show any marked variation. Six varieties of snapper gave similar patterns, as did the three groupers tested. Cod, haddock, and pollock did not show marked variation and gave two bands. Hake had one band. Atlantic and Pacific halibut gave only one band, while the so-called "Greenland halibut" had two bands.

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 ABSTRACTER: S. G. Cordell

7.8 A PROMISING NEW EVALUATION TECHNIQUE--INSTRUMENTAL/SENSORY FLAVOR CORRELATION

Hoskins, W. A. (Analytical and Administrative Services, Foremost Foods Company, San Franscico, California)
Food Product Development 2, No. 3, 24-25, 28 (June-July 1968)

In most instances, the measure of a product's flavor depends on the judgment of an expert or the evaluation of taste panelists. Thus, a new or improved product's economic success can hinge upon the validity of the subjective evaluation method. Now a California food company is perfecting an objective method for evaluating volatile flavoring compounds in foods. The method involves correlating and computerizing the data obtained from expert and consumer sensory panels, from instrumental analyses of flavor components, and from statistical analyses of flavor and taste.

The first step in this objective-subjective correlated analysis is the definition, by sensory panel, of a product's flavor standard. When final decision of the exact flavor balance has been decided upon, samples of the product are analyzed by gas chromatograph, and the results recorded. This chromatographic trace serves as a flavor control, or standard, against which future deviations can be measured.

The gas chromatograph used combines a specially prepared column, an inert carrier gas, and a programmed temperature increase that volatilizes and separates

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 ABSTRACTER: L. Baldwin

7.597 (*) ANALYSIS OF SATURATED ALDEHYDES BY GAS-LIQUID CHROMATOGRAPHY USING METHYLOLPHTHALIMIDE FOR REGENERATION OF THEIR GIRARD-T DERIVATIVES

Gadbois, Donald F., Paul G. Scheurer, and Frederick J. King (Bureau of Commercial Fisheries, Gloucester, Massachusetts 01930)
Analytical Chemistry 40, No. 8, 1362-1365 (July 1968)

Isolation and identification of micro amounts of carbonyls, such as those found in food products, have been accomplished by use of paper, column, thin-layer, and gas-liquid chromatography. To identify microquantities of carbonyls by such methods, sample concentrations are often necessary. Dilute aqueous solutions of standard aldehydes (C_2-C_7), ketones (C_3-C_8), and other types of carbonyls have been concentrated by a modified Girard-T procedure, which was considered as semi-quantitative. The object of this study was to determine the quantitative aspects of a Girard-T for concentrating carbonyls.

The new procedure developed has three main steps: (1) The aldehyde mixture is reacted with Girard-T reagent, and the derivative mixture is concentrated to dryness; (2) The aldehydes are liberated from the derivative mixture by heating with an excess of pure formaldehyde generated from methylolphthalimide; and (3) The aldehyde mixture is analyzed by gas-liquid chromatography. This recommended procedure includes use of methylolphthalimide or paraformaldehyde for the generation of formaldehyde used for regeneration of carbonyls from their Girard-T derivatives. To reduce the interaction of the solvent used for the reaction of

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 ABSTRACTER: S. G. Cordell

7.80 SENSORY AND OBJECTIVE MEASUREMENTS OF THE QUALITY OF FROZEN STORED COD OF DIFFERENT INITIAL FRESHNESSES

Connell, J. J., and P. F. Howgate (Torry Research Station, Ministry of Technology, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 19, No. 6, 342-354 (June 1968)

Both sensory and objective methods of evaluating the eating quality of frozen stored cod were used in this study. The sensory method used was a special taste-panel technique developed for this purpose and described by Baines et al. (1967). It seemed unlikely that a single objective method would be capable of assessing the eating quality of frozen cod of different initial qualities because the fish would have undergone spoilage during storage in melting ice and during frozen storage. The underlying chemistry of these two types of deterioration is quite different. However, tests are available, or have been proposed, which monitor both of these types of deterioration separately. The approach has been to apply several such tests simultaneously, in the hope that it would be possible to find out which tests or which combination of tests were most useful in predicting the various aspects of eating quality, and the overall acceptability.

The complete evaluation by objective means of eating quality in frozen stored cod must involve at least three tests: one to give an accurate assessment in terms of the changes resulting from "wet" spoilage, one to give an accurate assessment in terms of the changes resulting from frozen storage, and one to describe

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 ABSTRACTER: M. F. Tripple

7.597

Girard-T with carbonyls, t-butanol was used instead of ethanol, since it lacks alpha hydrogens and is therefore relatively inert.

The results of this investigation demonstrate improvements in accuracy over a previous procedure for analysis of saturated aldehydes present in dilute aqueous solution. The results indicated that the new procedure is suitable for quantitative or highly semiquantitative determination of aldehydes up to C_{11}.

7.597 PRESENCE OF FORMALDEHYDE IN FRESH LOBSTER WHEN TREATED WITH ALKALINE SULFITES

Caracciolo, S. (Controllo Vet. Prodotti Pesca, Pescara, Italy)
Chemical Abstracts 67, No. 1, 2231h (July 3, 1967)

7.597 DETERMINATION OF FORMALDEHYDE IN SEAFOODS, ESPECIALLY SHRIMPS

Hansel, G., and J. Wurzleger (Hyg. Inst. Freien und Hansestadt, Hamburg, Germany)
Chemical Abstracts 69, No. 19, 75617q (November 4, 1968)

7.591 (Cross Reference: 7.84)

Beef, horse, pork, and mutton gave different results both in protein and enzyme banding. Protein bands from mutton and goat are very much alike, but the esterase system for mutton gave three bands and for goat two bands.

The exact nature of the esterases involved is not known, but evidence points to the possibility that two esterase systems are present, both arylesterases and aliesterases.

7.591 BOVINE MILK LIPASE. I - ISOLATION FROM SKIM MILK

Fox, P. F., and N. P. Tarassuk (Univ. of California, Davis)
Chemical Abstracts 69, No. 5, 16356f (July 29, 1968)

7.80 (Cross Reference: 3.2492)

the differences in texture resulting from differences in initial pH. The best objective test for evaluating quality changes in the wet state is with hypoxanthine. The freshness of flavor score predicted from hypoxanthine will provide one facet of the overall eating quality of a particular sample.

The three methods used in this study were determination of the amount of protein extractable from frozen stored cod by means of neutral (about 0.5 M) salt solutions, the cell fragility method, and the color ratio method. At the present stage of development of such tests, the selection of an objective test for frozen storage deterioration depends largely upon the ability of the test to predict the degree of quality loss as measured by the accumulation of cold-storage flavor and the development of firmness. Of the three tests used, protein extractability was the best predictor of cold-storage deterioration in cod.

In 1967, Connell showed that protein extractability correlates much better with cold-storage flavor and firmness than results of the other two tests do. The authors suggest conducting replicate determinations using the other two methods to achieve the same precision as with the protein extractability method.

If all the predicted scores for freshness of flavor and cold-storage deterioration lie above the absolute rejection values, then the overall eating quality will depend on some combination of these scores. The exact way in which these predicted scores or the results of objective methods should be combined, and the weighting given to each, cannot be decided deductively and may vary with the consumer. [22 references]

7.8

the individual components contained in the concentrated flavor sample. As each compound emerges from the column, a detector senses its presence and sends an electrical signal to the recorder. The result is a pattern of peaks that is, in effect, the flavor profile of the product. Each peak represents a specific isolated flavor volatile; the area under each peak can be calculated to give the amount of the flavor volatile represented. These calculations can be made manually from a measurement of peak height and width, or they can be determined by more elaborate instruments that automatically integrate and record not only the peak areas but the time at which the peak emerged from the chromatographic column. Ideally, peak area information is fed directly from the chromatographic unit into a computer, where the data are calculated, stored, or correlated with other data--for example, peak-to-peak ratios for several key components can be calculated, compared, and analyzed.

Once a definite correlation between sensory judgments and peak profile changes has been established, the technique can be used to predict aging patterns, shelf-life limitations, the effects of processing modifications, or the variations in ingredients supplied from different sources. In the future, it may be used in the development of synthetic products, particularly those requiring a delicate match of the essential flavors characteristic of the natural or fresh product. Presently, its major importance is the cost and time it saves. As data accumulate and analyses and correlations become more refined, the amount of consumer testing required for a product can be reduced. Any reduction in the size of consumer panels and the frequency at which they are run will reduce both the cost of developing the product and the time required to get it on the market.

7.80 (*) STATUS REPORT: ODOR RESEARCH

Anonymous
Food Product Development 2, No. 3, 88, 90 (June-July 1968)

In this issue, the editor summarizes in detail several of the topics discussed during a program on the "Molecular Basis of Odor." The symposium, sponsored by the Letters and Science Extension, University of California, Berkeley, was held in San Francisco on April 25-27, 1968. Some of the participants and their topics follow.

John E. Amoore: the anatomy of olfaction and the quantitative measurement of odor (including the phenomenon of abnormal sensitivity--hyperosmia or anosmia); the stereochemical theory of odor (including the methods for measuring molecular shape and the basis for the theory that there are seven primary odors); two new methods of classifying odors (Schutz's matching standards method and the specific anosmia method).

D. S. Noyce: the conformational analysis of organic molecules (including the importance of a constantly changing configuration).

H. K. Burr: the integration of instrumental and organoleptic analysis of food volatiles (with emphasis on materials and techniques that minimize variation and bias).

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 ABSTRACTER: L. Baldwin

7.84 IDENTIFICATION OF COMMERCIALLY USED FISH FOUND IN THE PACIFIC BY DISK ELECTROPHORESIS

Chu, Rod (Food and Drug Administration, 50 Fulton Street, San Francisco, California 94102)
Journal of the Association of Official Analytical Chemists 51, No. 4, 743-746 (July 1968)

The disk electrophoresis method for rapid identification of sole and rock fishes of the Pacific coast was studied. Fifteen species from four families of fish were tested: five members of the sole family, eight of the rock family, whitebait, and kingfish. Such identification tests are useful for law enforcement purposes to detect substitutes or adulteration in fishery food products.

The five species of sole yielded electrophoretograms sufficiently dissimilar to identify them properly. The species of the rock family, with the exception of two of the members, could not be identified on the basis of their electrophoretograms. A fish could be identified as a rock, but it could not be identified as to species. A fish could be characterized as either a rock or a sole. The whitebait and kingfish had characteristic electrophoretogram profiles. The author concluded that the disk electrophoresis method can be utilized with limited success for the identification of sole and rock fishes.

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 ABSTRACTER: S. G. Cordell

7.89 (*) ANALYTICAL /TEST -- SINGLE INSTRUMENT MEASURES AND RECORDS

Anonymous
Food Product Development 2, No. 3, 91 (June-July 1968)

A mechanical "mouth" designed to chew food and express the simulated mastication on an X-Y recorder has recently been demonstrated. The device is a commercial version of earlier similar instruments; however, it is one of the first devices for measuring the magnitude of fracturability, chewiness, gumminess, adhesiveness, hardness, cohesiveness, springiness, and moisture and fat content. It consists of a masticator head, a sensing platform, a test plunger, and a two-speed strip-chart recorder that is sensitive enough to record force-time curves of very low magnitude. These curves are the graphic representation of a food product's texture.

The sample being tested is placed on the disklike platform, where it is contacted by an up-and-down plunger that is driven by an eccentric cam. The plunger is so oriented that it contacts a progressively larger area of the sample--that is, it essentially duplicates the mouth's motion during chewing. Force applied to the sample is maximum when the plunger is halfway between the up position and the down position; at extreme plunger positions, the applied force is minimum. The speed of the plunger can be adjusted to make either 12 or 24 chews a minute.

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 ABSTRACTER: L. Baldwin

9.11 (*) STUDIES ON THE TRAWL FISHING GROUNDS OF THE EASTERN BERING SEA. II - ON THE ANNUAL FLUCTUATION OF OCEANOGRAPHICAL CONDITIONS IN SUMMER SEASONS

Maeda, Tatsuaki, Takeji Fujii, and Kiyoshi Masuda (Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 34, No. 7, 586-593 (July 1968)

The authors have investigated oceanographic conditions on the Continental Shelf of the Eastern Bering Sea every summer from 1955 to 1967, except for the summer of 1957. The distribution of marine life and the annual fluctuation of temperature and salinity near the bottom have been the major interests. Some of their findings follow.

1. The cold-water mass near the sea bottom is centered southwest of St. Lawrence Island. It extends from this area like a tongue along both sides of St. Matthew Island and along the north side of St. Paul Island to Bristol Bay.

2. The water mass along the coast of Alaska has a low salinity. The water mass reaching from the edge of the Continental Shelf across the Western Bering Sea to Bering Strait has a high salinity.

3. High-water temperature coincides with high salinity, and vice versa.

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 ABSTRACTER: L. Baldwin

7.84 (Cross Reference: 7.51)

The following table gives a description of the electrophoretic bands of the various species of fish tested.

Fish	Band distribution*
Sanddab sole (Citharichthys sordidus)	ccbacaa
Rex sole (Glyptocephalus zachirus)	cbba
English sole (Parophrys vetulus)	ccbccbab
Petrale sole (Eopsetta jordani)	abcca
Dover sole (Microstomus pacificus)	bcaa
Splitnose rock (Sebastodes diploproa)	ccaba
Chilipepper rock (Sebastodes goodei)	bcbab
Bocaccio rock (Sebastodes paucispinis)	bccaac
Stripetail rock (Sebastodes saxicola)	ccaba
Widow rock (Sebastodes entomelas)	ccaba
Blue rock (Sebastodes mystinus)	ccaba
Olive rock (Sebastodes serranoides)	ccaba
Pacific ocean perch (Sebastodes alutus)	either ccaba or ccaaa, the separation not explicit
Whitebait [smelt] (Allosmerus elongatus)	ccacbca
Kingfish, or white croaker (Genyonemus lineatus)	ccbcccaca

*The author arbitrarily designated the bands as follows: Major bands (a) those which were either 2 mm. or greater in height or very deeply dyed; intermediate bands (b) were less than 2 mm.; and minor bands (c) were thin bands, usually traces.

7.80

In the next issue (August-September), the editor promises to summarize the discussions of (1) the electrophysiological aspects of olfaction and (2) the measurement and interrelation of odor, taste, and flavor.

9.11 (Cross Reference: 2.12)

4. From 1955 to 1959, temperature and salinity decreased. Since then, it has steadily increased.

5. The annual fluctuation of temperature and salinity influences the distribution and migration of fish shoals. Alaska cod (Gadus macrocephalus) and Alaska pollack (Theragra chalcogramma [chalcogrammus]) stay near the edge of the Continental Shelf when temperature and salinity are low. They migrate as far as southwest of St. Lawrence Island when temperature and salinity are high. [18 references]

[Abstracter: L. Baldwin]

The bacteria remain on the bottom.

The buoyancy. The bacteria itself releases gases to the surface by its own buoyancy. The bacteria remain on the bottom.

ship--upon command, the capsule is released by electrical commands from the capsule is recalled to the surface by acoustical commands from the capsule to the surface and the capsule is recovered by the tape recorder and the system, which provide power for the current meters, the digital recording system, which house the electronic systems (a rigger's mark, 96 cm. I.D.), which is filled with unsupported trisphere (5 cm. I.D.), which is filled with unsupported trisphere (5 cm. I.D.), which is filled with unsupported trisphere (5

9.16 AQUACULTURE

Bardach, John E. (School of Natural Resources, University of Michigan, Ann Arbor)
Science 161, No. 3846, 1098-1106 (September 13, 1968)

The annual harvest of fish throughout the world amounts to 53,000,000 metric tons. Of this amount, aquaculture furnishes over 2,000,000 metric tons, most of which is composed of animals raised in fresh or in brackish waters. This nearly 4 percent of the world catch, which, incidentally, is produced from a fraction of 1 percent of the world's water, far exceeds the United States' food-fish harvest. Among the fish species being cultured are carp (Cyprinus carpio), trout and salmon (especially Salmo gairdneri), milkfish (Chanos chanos), mullets (especially Mugil cephalus), yellowtail (Seriola quinqueradiata), channel catfish (Ictalurus punctatus), and Tilapia. Oysters (mainly of the genera Ostrea and Crassostrea) and shrimp (particularly Peneus [Acetes] japonicus) are also part of the total tonnage derived from fresh-water farms. Some marine fishes are also being cultured, notably plaice (Pleuronectes platessa), sole (Solea solea), sardine (Sardinops caerula), mackerel (Pneumatophorus [Scomber] diego), and pompano (Trachinotus carolinus).

To be productive for aquaculture, animals should have the following characteristics: (1) They should reproduce in captivity or in semiconfinement or they should yield easily to manipulations that result in maximum production of offspring so that selective breeding is possible. (2) Their eggs and their larvae should be hardy enough to permit being hatched or reared under controlled conditions. (3)

(over)

 ABSTRACTER: L. Baldwin

9.17 LAKE MICHIGAN: SALMON HELP TO REDRESS THE BALANCE

Carter, Luther J.
Science 161, No. 3841, 551-555 (August 9, 1968)

An attempt by man to control the ecology of a large inland sea is the current project of the Michigan Department of Conservation. Through legislative acts and the planting of coho salmon, the Department seeks the return of a natural balance between predator and prey in the lake fishery.

The ecological imbalance began when the Great Lakes were connected and the sea lamprey gained access to the upper Great Lakes. By the end of the 1940's the sea lamprey, which attaches itself to its victim with a suckerlike mouth and feeds on the blood of the host fish, had nearly destroyed both the lake trout and other predatory fish. As a result, the alewife, an anadromous species native to the Atlantic, began multipling rapidly in the lakes. This fish has little commercial value except to manufacturers of pet food and has displaced several commercially important native species. Other than for sporadic die-offs, when rotting alewives lined the beaches, this species proliferated unchecked. So, to rehabilitate the fishery, fisheries people began eliminating the sea lamprey by introducing selective poisons into the spawning streams.

(over)

 ABSTRACTER: L. Baldwin

9.19 SUMMARY REPORT -- ADVANCED WASTE TREATMENT
JULY 1964-JULY 1967

Anonymous
Water Pollution Control Research Series, Publication WP-20-AWTR-19, 96 pp. (1968)
(U.S. Department of the Interior, Federal Water Pollution Control Administration, Cincinnati, Ohio)

This report summarizes results of advanced waste-treatment made by the Advanced Waste Treatment Branch, Division of Research, Robert A. Taft Sanitary Engineering Center, from July 1964 to July 1967. Under a combined program of contract and intramural research, a wide range of wastewater-treatment processes have been evaluated for technical and economic feasibility at stages of development from laboratory scale through pilot scale. These treatment methods include processes for suspended solids removal, organic removal, inorganic removal, nutrient removal, and ultimate disposal of concentrated end products. Since it is obvious that the efficiency of the conventional biological processes greatly affects some of the advanced processes, studies of certain aspects of the biological processes have become a part of advanced waste-treatment research.

A number of processes have been studied extensively enough to assess their feasibility with a fair degree of accuracy. For wastewaters, with appropriate contaminant composition, lime clarification will effectively remove suspended solids and the nutrient phosphate. Since this method of treatment is widely used on potable water supplies, the economics are expected to be favorable. Alum

(over)

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9.3 FDA CANS IRRADIATED BACON

Jamison, Andrew
Science 161, No. 3842, 669 (August 16, 1968)

The Food and Drug Administration (FDA) originally granted approval of irradiated canned bacon in 1963. Now the FDA has decided to rescind its approval because, as the associate FDA commissioner for science stated, new data on irradiated bacon have shown "suggestions of adverse effects." The associate commissioner showed the results of experiments in which irradiated bacon was fed to rats. Charts of the results indicated adverse effects on the reproductive process, "apparent production of antinutrient factors," and "apparent effects on mortality, body weight gain, and red-blood cell count and hemoglobin."

The FDA decided to reexamine the data for irradiated bacon after it turned down a petition by the Department of the Army for approval of irradiated canned ham. Because suggestions of adverse effects were found in the data presented in support of the petition for ham, the FDA decided to ask for more data on bacon. The deleterious effects of irradiated bacon were then found.

The Army is now working closely with FDA officials to set up protocols for 2-year feeding studies on irradiated ham. Feeding studies on bacon are not planned at the present time, although the Army might study bacon sometime in the future.

(over)

 ABSTRACTER: M. F. Tripple

9.17 (Cross Reference: 1.33)

Now the coho salmon, an alien from the Pacific coast, has been planted in two tributaries of Lake Michigan. This voracious predator will restore, the Department hopes, an ecological balance to Lake Michigan.

Success of this program for the management of nature depends on the Department's ability to overcome several problems. The indiscriminate use of pesticides, such as DDT and dieldrin, and the increasing threat of eutrophication are two major problems. New legislation has been proposed to control the use of "hard" insecticides, and legislation has already been passed against the dumping of wastes containing large amounts of phosphorus (which plays a key role in the eutrophication process).

Authorization from a new state law allows the Department to limit the number of commercial fishing licenses issued: fix catch quotas; and prescribe when, where, and how catches may be made. For the moment, commercial fishing for coho is not allowed; only sports fishermen may catch the fish. These steps, coupled with rapidly expanding hatchery operations and improvements in stream habitats and fish passage facilities, should help immeasurably in the Department's efforts to keep a balance between predator and prey in Lake Michigan.

9.3 (Cross Reference: 3.15)

Irradiated bacon had not been produced for the commercial market before the approval was rescinded. Two private companies had produced 15 tons of irradiated bacon in 1966, but this bacon was used by the military for tests and experiments, and none was used in the regular military diet. Commercial production of irradiated foods must now wait until the FDA approves the Army petition because research and tests are too expensive for private companies to undertake independently. Work on a commercial plant, which was to produce irradiated meats on a large scale, was postponed after the ham petition was rejected. Other interested commercial meat producers will continue to wait.

The FDA wants to be sure that the irradiated products are safe, and it feels that this has not been demonstrated in the case of irradiated bacon. Until the Army and FDA reach an agreement as to what constitutes acceptable data, what is an acceptable display of safety, and what are acceptable feeding studies, the acceptance of irradiated foods will continue to be difficult.

9.16

The young should have food habits that facilitate their being satisfied from the very early stages by extraneous feeds. These feeds should be abundantly available, cheap, and readily produced in the area where the species is being cultured. (4) They should gain weight fast.

The problems attendant upon breeding aquatic animals are economic as well as technical and nutritional. Yet, intensive husbanding can increase the yield per unit of effort, reduce production costs per unit of weight, and remove cultured fish products from the exclusive province of the luxury food item. The author points out that, under favorable conditions, production of animal flesh from a unit volume of water far exceeds that attained from a unit surface of ground. The logical expectation, then, is that aquaculture will develop substantially by the end of the century, and with the development will come an appreciable increase in the yield of fishery products.

Some of the interesting comparisons the author makes during his appraisal of current and potential aquaculture operations are tabulated below.

Aquatic animal cultured	Country where cultured	Yield	Wholesale value
		kg/ha/yr	$/ha/yr
Oysters (on public grounds)	United States	9	38
(in heated hatcheries)	United States	5,000	21,000
(on scallop-shell rens)	Japan	58,000	67,000
Shrimp	Japan	6,000	43,000
Mussels (hanging culture)	Spain	300,000	49,000
Catfish (unfertilized ponds)	United States	200	70
(fertilized ponds)	United States	3,400	2,400
Milkfish (fertilized ponds)	Indonesia	2,000	600

9.19 (Cross Reference: 9.4)

clarification is expected to be a successful method of treatment in other locations at a cost of 8 cents/1,000 gal. or less for a 10-mgd plant. For organic removal, activated-carbon treatment is very promising. Granular-carbon treatment without clarification of the feed can be carried out for about 8 cents/1,000 gal. at the 10-mgd level. There will be some turbidity in the product water. Powdered-carbon treatment has been estimated to cost about 12 cents/1,000 gal. for the same capacity plant, provided the carbon can be reactivated. Process improvements, however, should reduce the cost. The powdered-carbon treatment gives a highly clarified water. The problem of reactivating powdered carbon will be intensively studied. For removal of gross inorganic content, electrodialysis treatment should be possible for about 16 cents/1,000 gal. in a 10-mgd plant. Fouling of electrodialysis membranes presents some problems. Pre-treatment of the feed by clarification and carbon treatment appears to be a necessity. Other inorganic removal processes such as ion exchange and reverse osmosis may be competitive with electrodialysis, but they have not been as extensively studied. Removal of nitrogen, either as ammonia or nitrate, is a difficult problem. An air-stripping process for ammonia appears technically feasible and should not cost over 2 cents/1,000 gal. for a 10-mgd plant, excluding the cost of adjustment of pH to 10 or above. Initial study of denitrification of a highly nitrified effluent or granular activated carbon shows promise for nitrate removal.

Study of a number of processes given preliminary evaluation has been halted, at least for the present. Electrochemical treatment appears to be economically unfavorable. The foaming process, although technically feasible for removal of certain soluble and suspended organic materials, and while economically promising, has not been generally necessary since the introduction of biodegradable anionic detergents in 1965. Solvent extraction, distillation, and freezing also have encountered a number of problems that limit their usefulness.

0.8 (Cross Reference: 2.118)
(*)

SEA WATER ICE MAKER

Anonymous
Australian Fisheries Newsletter 27, No. 7, 25 (July 1968)

An ice-making machine that freezes salt water has been invented in the United States; it is now being used in Australia. The machine can make 2,000 lb. of ice a day using water between the temperatures of 70° and 80° F. It can be mounted on the deck and connected with a direct chute to the storage area.

Advantages provided by this freezer are the elimination of ice storage on board, the lower melting point of salt-water ice, and the lower likelihood of damage to the seafood through tearing, since blocks of salt-water ice are less likely to freeze together than are blocks of fresh-water ice.

[Abstracter: S. G. Cordell]

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0.9 LOW WATER OF HYDRATION ALKALINE EARTH PHOSPHATE GRANULES PREPARED FROM SEAWATER

U.S. Patent 3,384,451
Chemical Abstracts 69, No. 13, 51248u (September 23, 1968)

2.05 (*)

THERMAL RESISTANCE OF SALMONELLAE ISOLATED FROM DRY MILK

Read, R. B., Jr., J. G. Bradshaw, R. W. Dickerson, Jr., and J. T. Peeler (Food Protection Research, National Center for Urban and Industrial Health, Public Health Service, Cincinnati, Ohio 45202)
Applied Microbiology 16, No. 7, 998-1001 (July 1968)

The purpose of this study was to determine if six species of salmonellae isolated from dry milk possessed such a heat resistance that they could survive the milk pasteurization process recommended by the Public Health Service. Salmonella anatum, S. binza, S. cubana, S. meleagridis, S. newbrunswicki, and S. tennessee were isolated from dry milk; S. senftenberg 775W came from a culture collection. All seven species were studied for heat resistance.

Thermal inactivation determinations were made on washed cells suspended in sterile whole milk. With the exception of S. senftenberg, the D values ranged from 3.6 to 5.7 seconds at 62.8° C., from 1.1 to 1.8 sec. at 65.6° C., and from 0.28 to 0.52 sec. at 68.3° C. Corresponding D values for S. senftenberg were 34.0, 10.0, 1.2, and 0.55 sec. for exposure temperatures of 65.5°, 68.3°, 71.7°, and 73.9° C., respectively. The present milk pasteurization processes as recommended by the 1965 Pasteurized Milk Ordinance of the Public Health Service will inactivate all seven strains of salmonellae, provided that the initial concentration does not exceed a calculated 3×10^{12} salmonellae per milliliter of milk.

[Abstracter: M. F. Tripple]

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1.30 (Cross Reference: 9.17)
(*)

THE ATLANTIC SALMON -- A VANISHING SPECIES?

Netboy, Anthony
The Atlantic salmon a vanishing species?, 457 pp. (n.d.) (Faber and Faber, 24 Russell Square, London, W.C.1, England) 70s
Reviewed by D. J. Piggins
New Scientist 39, No. 614, 561 (September 12, 1968)

This book reports the author's findings during a 15,000-mile tour of the major salmon-producing countries along the Atlantic. It compares the present state of salmon stocks in each country with the state of the stocks in earlier centuries, relating the social and economic history of each country to the decline of the salmon resource. It reviews "more in sorrow than in anger" the factors that have brought the salmon to the verge of extinction and suggests measures for conserving the remaining resource. In addition to the usual suggestions, it emphasizes means of regulating the increasing exploitation on the high seas.

[Abstracter: L. Baldwin]

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1.017

AUSTRALIAN UNIT FISHERIES

Anonymous
Australian Fisheries Newsletter 27, No. 9, 1-59 (September 1968)

"The Australian Fisheries Newsletter" marked the 13th session of the Indo-Pacific Fisheries Council, which met in Brisbane in October, by publishing descriptions of the most important Australian fisheries. Some of the descriptions have appeared previously, but they have been updated and expanded for this special issue, which is intended to serve as a guide to Australian fisheries.

The issue contains the following articles: Australian fisheries scene, Southern crayfish, Western crayfish, East coast prawns, West coast prawns, Australian salmon, South-east edible shark, Snoek, Southern bluefin tuna, East coast "trawling," Abalone, Southern scallops, and New South Wales rock oyster.

[Abstracter: S. G. Cordell]

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7.523 DETERMINATION OF AVAILABLE LYSINE BY USING AMINO ACID ANALYZER

Sasano, Yūichi, Takashi Yoshiwara, and Toshie Ōki (Taiyo Fisheries Co., Ltd., Taiyo Research Laboratory, Tsukishima, Chuo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 34, No. 7, 613-617 (July 1968)

The amount of available lysine (total lysine less residual lysine) in several proteins was determined with an amino-acid analyzer. The results were compared with results obtained by use of the Carpenter method, which is based on the reactivity of dinitrofluorobenzene with the free ε-amino group of lysine. For casein, fish meal, cottonseed meal, and meat meal, the results were quite similar. But for whale meal, sperm whale meal, and blood meal, the authors' method was more satisfactory. In addition, they believe that it is more convenient.

The direct determination of ε-dinitrophenyl lysine with the amino-acid analyzer was also described. A pH 8.0 buffer gave higher percentages of availability for white fish meal and formalin-treated fish meal than a pH 5.28 buffer did; it gave slightly lower percentages for heated fish meal, whale meal, and groundnut meal. [Abstracter: L. Baldwin]

2.145 NEW SERIES FOR CASPIAN SEA WILL PUMP CATCH ABOARD

Burgess, John, and Peter Hardy
Fishing News International 7, No. 10, 63-64 (October 1968)

The Kaspi, the first of 22 pump fishing vessels ordered by the Soviet Union for the kilka fishery, has been delivered for use in the Caspian Sea. The Kaspi was built in East Germany and is equipped with powerful suction pumps and electric lights for fishing for small herring and similar fish. The pumping equipment consists of a compressor, control panel, water separator, air and water hoses, mixer, suction intake, and cables with electric lamps.

The lighting apparatus is lowered over the side and attracts the fish. Two airlift pumps siphon the fish aboard; the fish are then passed through a water separator into a grading machine and then into a chilling tank. After they leave the chilling tank, where they are precooled, the fish go to a conveyor-type quick freezer, which can freeze 22.5 tons a day. Additional chill tanks are available for use when the catch rate exceeds the processing rate. The 720-ton holds store frozen blocks of fish.

One 2-ton pump displayed at INRYBPROM-68 can deliver 1½ metric tons of fish, with 250 cu. m. of water, an hour. Its power consumption is 24 kw. The whole unit weighs 2 tons. [Abstracter: S. G. Cordell]

0.39 RATE OF UBIQUINONE OXIDATION IN ELECTRON TRANSPORT PARTICLES REDUCED BY SUCCINATE

Storey, Bayard T. (Johnson Research Foundation, University of Pennsylvania, Philadelphia 19104)
Archives of Biochemistry and Biophysics 126, No. 2, 585-592 (August 1968)

Earlier reports have shown that electron transport particles (ETP) prepared from beef-heart mitochondria by alkaline treatment have reduced both nicotinamide adenine dinucleotide oxidase and succinate oxidase activity but do not have the capacity to conserve energy resulting from oxidation of these substrates. The ETP contain endogenous ubiquinone amounting to one-half to one-fourth that of beef heart mitochondria (calculated on a protein basis). The particles apparently are useful in defining the role of ubiquinone in mitochondrial electron transport. Earlier papers by the author reported on the kinetic studies of the reduction of oxidized ubiquinone in these particles by succinate, by reduced nicotinamide adenine dinucleotide (NADH), and by N,N′-tetramethyl phenylenediamine. In this paper the authors report on the kinetics of the complementary reaction, the oxidation of reduced ubiquinone.

The half life of reduced ubiquinone in ETP made anaerobic with succinate is from 3 to 6 msec.; that of cytochrome c is between 2 and 3 msec. Half-life time for oxidation of reduced cytochrome b is greater, being in the range of 60-100 msec. From these results, the author suggests that ubiquinone and cytochrome b form two branches of electron transport between succinate and cytochrome c, but that most of the electron transport occurs through ubiquinone. It appears that increasing the disruption of mitochondrial structure decreases the rate of electron flux through cytochrome b and increases the rate through ubiquinone. The author indicates that assignment to ubiquinone of a central function in electron transport, based on experiments involving disruption and fractionation of the electron transport chain, is not justified. [Abstracter: F. T. Piskur]

2.05 SOME NUTRITIONAL FACTORS GOVERNING GROWTH AND TOXIN PRODUCTION BY CL. BOTULINUM, TYPE E

Gullmar, B., and N. Molin (Swedish Institute for Food Preservation Research (SIK) Göteborg)
Svenska Institutet för Konserveringsforskning 189, pp. 185-201 (n.d.)

Prior investigations on the reaction of Clostridium botulinum to environmental factors cannot be compared because of small, but significant, differences in the standard growth medium used. The variables influencing the growth and toxin formation of C. botulinum have not been fully investigated, partly because of the lack of suitable chemically defined media, which are necessary in research on the effect of growth factors. The present investigation is part of a series of studies on the nutritional requirements of C. botulinum Type E. The authors thought that such an investigation might also elucidate the mechanism of toxin formation.

Growth and formation of toxin by C. botulinum Type E strain 1537/62 was promoted in a chemically defined medium. Toxin yield diminished after 10 or more transfers. The synthetic medium supported germination and sporulation; however, the cells showed pleomorphic forms. Certain nutrients were found to be essential; 0.6 milligrams of tryptophan per 100 milliliters of medium gave optimum toxin yield and 0.1 mg. per 100 ml. gave optimum growth. Toxin yield was increased by addition of 0.1 and 1 p.p.m. of linoleic acid; higher concentrations of linoleic acid inhibited growth. The most toxin was obtained with 0.1 and 6 percent of glucose, and optimum growth was obtained with 1 percent of glucose. [21 references] [Abstracter: M. F. Tripple]

2.118 TWO NEW FREEZER FACTORYSHIPS MAY PUT U.S. BACK INTO THE FISH INDUSTRY RACE

Anonymous
Quick Frozen Foods 31, No. 2, 97-99 (September 1968)

The Sea Freeze Atlantic and her sister ship, the Sea Freeze Pacific, are the largest factoryships to be built and launched in the United States. These $5.4 million ships will, hopefully, revitalize the U.S. fishing industry and provide a quality fish product for the commercial market.

Each ship has an overall length of 296 ft. 10 in.; a beam of 44 ft. 3 in.; a displacement of 3,120 tons; a speed of 14.4 knots; a trawling pull of 20 tons; and a cruising radius of 26,000 miles. Each contains processing plants that are 140 ft. long and 40 ft. wide. Freezing capacity is from 6 to 7 tons an hour, or about 50 tons a day. Refrigerated storage space for each ship is estimated at 50,000 cu. ft.

Unlike other fishing fleets, which usually process their catch from 10 to 12 days after the fish are caught, these ships will process their catch immediately; thereby, a high-quality product will be achieved. After preliminary processing, the fish will be blast frozen and packed in 6½-lb. blocks. Scraps and trash fish will be converted to fish meal and oil for poultry-feed and industrial purposes.

The 56-member crew of the Sea Freeze Atlantic will fish for cod and haddock off the coasts of Greenland and Iceland. The 56-member crew of the Sea Freeze Pacific will fish off Alaskan waters. [Abstracter: S. G. Cordell]

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3.2385 THE CONVENIENCE GAP IN TODAY'S PACKAGING

Ruhmann, L. F. (Design and Market Research Laboratories, Container Corporation of America, Chicago, Illinois)
Food Product Development 2, No. 3, 66-68, 70 (June-July 1968)

The author's thesis is that we are not creating the convenience packaging that modern technology and design permits--the consumer must still put up with too many sardine cans, too many catsup bottles, too many flour bags as genres of packaging. Convenience embodies all those factors that afford the least possible amount of physical and mental exertion. In this context, the product and the package become a single entity. Thus, TV dinners or quickly made gelatin desserts are not convenient, for their preparation requires a series of operations that may actually be inconvenient.

A survey of what housewives consider the most important characteristics of convenience shows the following, in order of importance: ease of preparation, ease of cleaning up, simplicity of preparation, speed of preparation, and speed of cooking (within the limits of a certain reasonable norm). To these, the author adds ease of opening, portion control, ease of storing the excess, lack of waste, and disposability. When these characteristics are designed into a package-product, the seller has a substantial competitive advantage. Therefore, a producer should not look upon packaging simply as a cost of production; he should view it as an essential cost of selling, a promotional element--an aspect of marketing. [Abstracter: L. Baldwin]

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3.230 PRESERVATION BY FREEZING

Holdsworth, S. D. (Fruit and Vegetable Preservation Research Association, Chipping Campden, Gloucester, England)
Food Manufacture 43, No. 7, 38-42 (July 1968)

This article reviews some of the current aspects of freezing foodstuffs. The established mechanism of the freezing process and the underlying principles are outlined in order to examine areas requiring further study. This outline is followed by a discussion of developments in freezing techniques, including cryogenic and fluidized-bed methods. The economic problems involved are assessed, as are the technological aspects of freeze concentration of foods. Other important aspects included in this article are packaging materials and storage characteristics of frozen foods.

Discussed under the heading of "basic aspects" are the mechanisms of freezing and thawing, and the effect of freezing rate on quality of the product. Under the heading of "practical aspects" are calculation of freezing times and new methods of freezing, such as cryogenic freezing, fluidized freezing, and freezing concentration. [30 references] [Abstracter: M. F. Tripple]

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3.2491 RATE OF DETERIORATION OF FREEZE-DRIED SALMON AS A FUNCTION OF RELATIVE HUMIDITY

Martinez, F., T. P. Labuza (Massachusetts Inst. of Technol., Cambridge, Mass.)
Chemical Abstracts 69, No. 15, 58438q (October 7, 1968)

3.4 SOME COLLOID PROPERTIES OF CURING SMOKE

Khvan, E. A., B. F. Sadovskii, and N. A. Voskresenskii (All Union Research Inst. of Fish Industry and Oceanography, Moscow B-140, U.S.S.R.)
Rybnoe Khoziaistvo 44, No. 7, 43-45 (1968) (Moscow, U.S.S.R.)

The diameter of smoke particles and the sedimentation of the dispersed phase under the influence of gravitational forces and electrostatic precipitation were investigated with the help of an impactor and an electrostatic smoking unit. The smoke was produced from sawdust containing 15 percent of water in a semi-automatic generator at controlled temperature. It was found that the diameter of 80 percent of particles was below 1 μm. Increase of temperature of smoke generation from 300° to 600° caused a growth of the weight concentration of the smoke from 8 to 170 mg/m^3. The precipitation of the smoke particles on a unit area of fish skin increased linearly with the weight of fish loaded into the electrostatic smoking kiln. [Abstracter: Z. E. Sikorski]

*Items on back of card.

3.4 CHEMICAL PROBLEMS DURING THE SMOKING OF FISH

Ruiter, A. (Inst. Visserijprod. TNO, Ijmuiden, The Netherlands
Chemical Abstracts 69, No. 7, 26131t (August 12, 1968)

FACTORYSHIPS

PROCESSING FROZEN FISH
CHANGES IN FROZEN FISH DURING COLD STORAGE

PACKAGING

SMOKED FISH

3.231 NEW COOLER DOOR -- HERE ARE THE PLUSES

Anonymous
National Provisioner 159, No. 17, 30-31 (October 26, 1968)

Up to now freezer doors have required construction of wooden bucks to carry the weight of the door. This requirement has limited the use of panel insulation, for panels are usually not load bearing. It also adds to the cost of construction, since the various trades doing the building must be so closely coordinated.

Now an insulated, power-opened cooler door that arrives already assembled from the factory solves these major problems. It slides horizontally into the pockets of a supporting frame, which transfers the weight of the door and its electrical driving mechanism directly to the floor. Thus, insulated wall panels can be used. Thermal breaks connect opposing steel structures, so little heat is transferred from the warm to the cold side. The doors open within 3 seconds of being activated; moreover they can be equipped with controls that permit the opening to be limited to 25 percent of full position (for movement of personnel, for example) if so desired.

The new cooler-door system has been tested for several months by a federal agency, according to the president of the firm that manufactures the door. For the test, the door has been set to open and close at the rate of 6 cycles a minute, 24 hours a day. [Abstracter: L. Baldwin]

3.4 SURVEY OF POLYCYCLIC AROMATIC HYDROCARBONS IN SMOKED FOODS

Malanoski, A. J., E. L. Greenfield, C. J. Barnes, J. M. Worthington, and F. L. Joe
J. Ass. Anal. Chem. 51, No. 1, 114-121 (1968)
Food Science Abstracts 2, No. 4, Abstract No. 68/487, p. 171 (April 1968)

Polycyclic aromatic hydrocarbons that may be present in smoked foods must be determined, for some of them have been found to cause certain types of cancer. Work that has been carried out on smoked fish is reviewed. Benzopyrene has been detected in many smoked fish and meats; these foods are listed, together with the smoking method and the amounts of benzopyrene found by two methods. Further work on this subject must be done before satisfactory smoking conditions can be specified. [8 references]

3.9 FERMENTATION OF NUTRITIVE WHALE MEAT

Sushko, A. M. (U.S.S.R.)
Chemical Abstracts 69, No. 9, 34763r (August 26, 1968)

2.118 (Cross Reference: 1.85)

SEAFREEZE SYSTEM MAINTAINS FRESHNESS FOR MARKET DAY

Anonymous
Fishing Gazette 85, No. 7, 51 (July 1968)

A shipboard method of keeping shrimp fresh for market has been introduced and tested. The process involves heading the shrimp, freezing them individually, coating them with a jacket of ice, and then placing them in a storage area kept at -10° to -20° F. The processing units, which are constructed of fiberglass and designed to fit customary hatch openings, can freeze from 500 to 800 pounds of shrimp an hour.

Part of the process is application of a protective glaze of salt, water, and corn syrup. The glaze is flexible, does not crystallize, and will not crack or chip. The glaze prevents oxidation and preserves the natural juices of the shrimp.

The process is so fast that the weight lost by the shrimp before being solidly frozen is less than 0.1 percent by volume. Moreover, it prevents freezer burns, discoloration, and black point; it eliminates the need for ice storage space on the vessel; and, the inventor claims, it permits the shrimp to be kept frozen for any length of time, then thawed, deshelled, deveined, and refrozen without adverse effects on the shrimp. [Abstracter: S. G. Cordell]

3.239 STUDIES ON THE RETENTION OF MEAT COLOR OF FROZEN TUNA. V - EFFECT OF FREEZING RATE

Bito, Masamichi (Tokai Reg. Fish. Res. Lab., Kachidoki, Chuo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 34, No. 7, 608-612 (July 1968)

The effect of freezing rate on the formation of metmyoglobin, and therefore on the color, of stored tuna was examined.

In the first experiment, blocks of tuna 3x3x3 cm. were cooled at -10° C. till their centers reached -10° C., and then they were stored for 30 days. The blocks that were frozen slowly in still air discolored more rapidly than did the blocks that were frozen rapidly in alcohol containing dry ice.

In the second experiment, the same size blocks were used, but they were stored for 60 days at either -20° C. or -33° C. The surface areas of the blocks that were stored at -20° discolored at the same rate whether the blocks were frozen slowly to -5° in still air or rapidly to -20° in alcohol containing dry ice. Although initially the rate of discoloration at the center was slower for the rapidly frozen blocks, the difference disappeared as the period of storage increased. Discoloration in the blocks stored at -33° was comparatively uniform at the surface and the center of rapidly and slowly frozen blocks.

The author concludes that the freezing rate is of some importance to the color of frozen, stored tuna, particularly if the storage time is short. [10 references] [Abstracter: L. Baldwin]

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